

MARINE REVIEW.

VOL. XIV.

CLEVELAND, O., OCTOBER 29, 1896.

No. 18.

Naval Architects and Marine Engineers.

It is announced that Hon. H. A. Herbert, secretary of the navy, will be the guest of the Society of Naval Architects and Marine Engineers at the banquet to be given in connection with the fourth general meeting of the society, which will take place in New York city at 10 a. m., Thursday, Nov. 12, 1896. Through the courtesy of the president and managers of the American Society of Mechanical Engineers, the meetings will again be held in the auditorium of No. 12 West Thirty-first street, the sessions continuing through Thursday and Friday, Nov. 12 and 13. There will be a banquet at Delmonico's at 7 p. m., Friday, Nov. 13, to which members and their guests are invited. In order that suitable arrangements may be made, the executive committee request that members will notify the secretary, Francis T. Bowles, No. 12 West Thirty-first street, New York, as early as practicable, of their intentions as to the banquet; and also as to the probability of their attending the meetings of the society. Members intending to propose candidates for membership are requested to notify the secretary in order that the necessary blank forms of application may be forwarded and properly filled out. The list of papers to be read at the meeting is as follows:

THURSDAY NOV. 12, 1896.

1. "Test of an Experimental Turret of the U.S. Battleship Massachusetts," by Commodore W. T. Sampson, U. S. N., chief of bureau of ordinance, navy department, Washington, D. C.
2. "Steel Canal Boats," by Lewis Nixon, manager Crescent ship yard, Elizabeth, N. J.
3. "Trial Performance of the Grand Duchess," by Sommers N. Smith, manager Newport News Ship Building & Dry Dock Co., Newport News, Va.
4. "Naval Practice in Ship Rivets and Riveting," by Naval Constructor J. H. Linnard, U. S. N.
5. "American Fire-Boats," by H. DeB. Parsons, marine engineer.
6. "Corn-Pith Cellulose," by Henry W. Cramp, vice-president Wm. Cramp & Sons, Philadelphia, Pa.

FRIDAY NOV. 13, 1896.

7. "The New Battleships," by Chief Constructor Phillip Hichborn, U. S. N.
8. "Speed Trials of a Screw-Propelled Ferry Boat," by F. L. Dubosque, engineer floating equipment, Pennsylvania railroad.
9. "Hydraulic Sheers for Lifting One Hundred and Twenty-five Tons," by Frank B. King, marine engineer and naval architect.
10. "A Method of Calculating the Stability of Ships, Adapted to the use of Standard Curves of Stability," by Hugo Hammar, naval architect.
11. "Stability of a Ship in Damaged Condition," by James Swan, Massachusetts Institute of Technology.
12. "Damaged Conditions as Affecting the Stability and Fighting Efficiency of Battleships," by Assistant Naval Constructor T. F. Ruhm, U. S. N.
13. "Screw Propellers," by Prof. George R. McDermott, Cornell University, Ithaca, N. Y.

Most vessel owners are of the opinion that the present lake freight rates, which are fairly profitable, will hold out during the coming month, with probability of some improvement on final cargoes. Ore shippers have not been wanting a great deal of wild tonnage, but they have been getting practically nothing during the past ten days, and if the demand for grain carriers should fall off a little, it is probable that the ore yet to be moved would be sufficient to uphold the freight market. Sales of non-Bessemer ore are still quite important, and advances in prices equivalent to the extra freight are being paid on ore of this kind that is brought down from the mines on account of present sales. Improvement is also reported in the market for Bessemer pig iron, which is selling at an advance of about 25 cents a ton over last week.

To make Crusiers of Lake Steamers.

Chief Constructor Hichborn of the United States navy has just submitted to Secretary Herbert his report for the year ending June 30, 1896. The report refers to plans prepared during the past year by the bureau of construction and repair for converting several classes of merchant steamers, on the lakes as well as on the sea coasts, into effective auxiliary cruisers. Among vessels on the lakes for which such plans have been prepared are the steamers Owego and Hudson of Buffalo. Plans for converting such vessels into cruisers have been prepared with a view to urging the appropriation of funds to provide outfits for the vessels that could be kept in readiness for immediate use.

The chief constructor's report shows a total of 110 vessels in the United States navy, of which thirty are armored, including eight battleships, two cruisers, one ram, six double turreted monitors, all of which are in active service, prepared for offensive or defensive operations, and thirteen single turret monitors, which might be utilized in the harbors in which they now lie. Three other armored battleships are now under construction. There are twenty-five new steel cruisers also in commission, in addition to the three special class vessels of the new navy—the Bancroft Dolphin and Vesuvius. These are unarmored, as are the sixteen iron and wooden cruisers and six wooden sailing vessels still carried on the lists. Three torpedo boats are in use and fifteen under contract. The other vessels building are six gunboats, one submarine boat and fifteen torpedo boats. Twelve tugs are also included in the naval force and fifteen old ships unfit for sea. During the fiscal year nine vessels were added to the effective force of the navy, and during the current year the Brooklyn, Iowa, Nashville, Wilmington, Helena, Puritan, six gunboats, seven torpedo boats and one tug are to be added.

Repeal of old Navigation Laws.

In his latest annual report, which is not as yet in print, Mr. E. T. Chamberlain, commissioner of navigation, recommends to congress the repeal of eighteen sections or statutes relating to minor matters in navigation laws on the ground of their uselessness. The report is devoted chiefly to recommendations for the repeal of many of our navigation laws of the last century, which were copied verbatim by the earliest congresses from laws of George III. of England. Commissioner Chamberlain points out that every other nation long ago repealed these laws, but we alone retain them as a handicap on our merchant marine. He shows that our merchant marine is in the keenest competition, first with merchantmen of foreign nations, whose governments have freed them from the shackles of old laws which we still retain, and again with American railroads, which are strongly organized and have protected themselves generally from burdensome laws under which navigation interests are compelled to operate.

The old City of Buffalo, built at Buffalo in 1859-60, had paddle-wheels 36 feet in diameter by 11 feet face, buckets 11 feet by 3 feet 6 inches, dip 5 feet. Taking the efficiency and velocity of the paddle at the center of resistance and immersion, the diameter would be 33 feet 6 inches; the revolutions were exactly 17.5 per minute, day in and day out, consequently the wheel traveled 110,800 feet per hour at the center of pressure. This gives exactly twenty-one miles per hour for the boat, neglecting slip; allowing 6 per cent. for slip, the old City of Buffalo made 19.4 miles per hour, which is good work for a heavy vessel of 11 feet mean draught. This speed, so far as land-marks go, was corroborated in practice.—The Engineer, New York.

Secretary of the Navy Herbert has decided to name the new battleships Alabama, Illinois and Wisconsin. The gunboats will bear the names Annapolis, Marietta, Newport, Princeton, Vicksburg and Wheeling.

A photograph of the largest boat on the lakes, the Sir Henry Bessemer, will cost you only \$1.50. Write the Marine Review.

IF YOU HAVE MONEY TO BURN

You can burn it in the boilers of your steamers without knowing it until the fuel bills come in. If not you will be interested in

AN INVESTMENT THAT PAYS 20 PER CENT.

Take all your fuel bills for the season and add up the amounts. If you have a modern steamer divide the total by 5, and the result will be

THE AMOUNT OF MONEY YOU "BURNED" THIS SEASON,

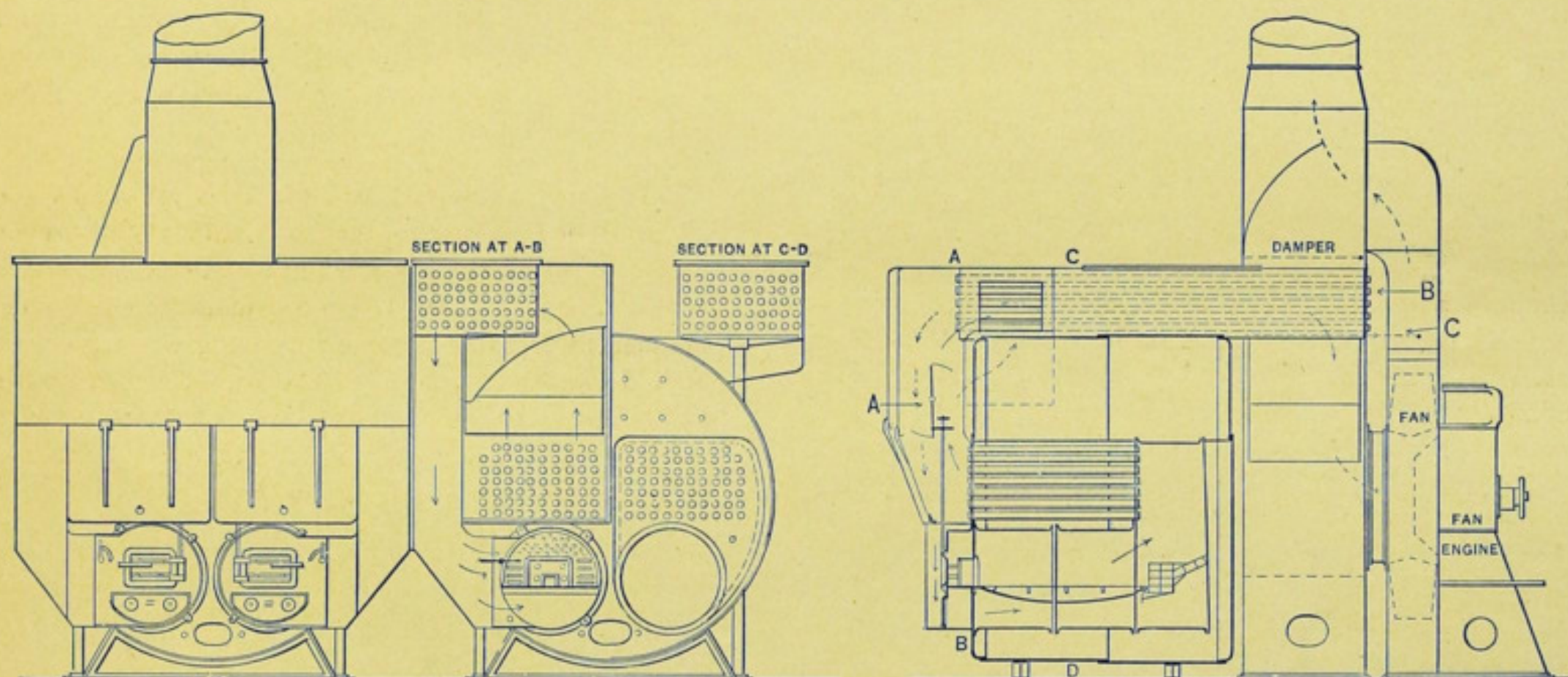
And the amount you can save next season by having your steamer equipped with the

ELLIS & EAVES SYSTEM OF DRAFT.

If you are interested in reducing the fuel consumption of your steamer to the lowest possible point, divide the total of the season's fuel bills by 3, and after looking at the result figure how much you can afford to pay to have your boilers retubed with

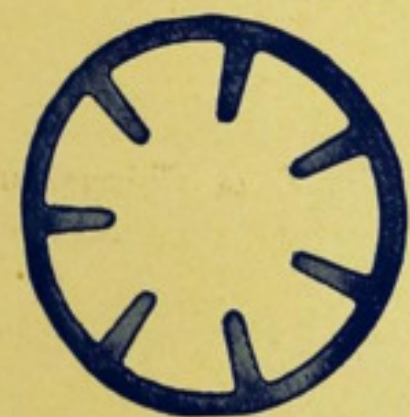
SERVE RIBBED TUBES

In addition to having the Ellis & Eaves system of draft. The draft will save 20 per cent. of the fuel and the tubes from 10 to 15 per cent. additional.



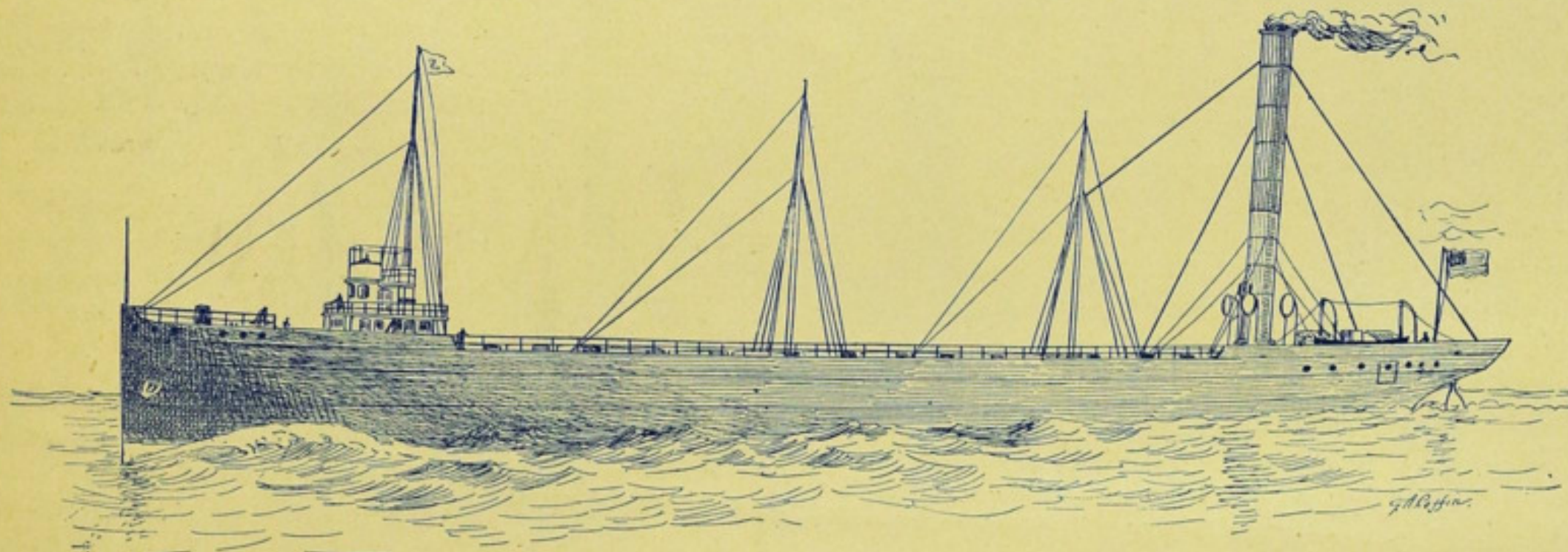
IF YOU ARE SKEPTICAL

You can refer to a table on pages 196-97 BLUE BOOK OF AMERICAN SHIPPING, which gives the coal consumption of ten modern lake steamers an average of 2.22 pounds per horse power per hour.



THE TEST OF THE STEAMER L. C. WALDO,

See MARINE REVIEW Oct. 22, fitted with the ELLIS & EAVES DRAFT, shows a consumption of 1.79 pounds—a saving of 20 per cent. with plain tubes. With SERVE TUBES and subtracting for auxiliary machinery, this can be reduced to 1.5 pounds, a saving of 33 1/3 per cent. The simplicity of this system of draft and the construction of the tubes will commend themselves to the most practical ship owners, builders and engineers, when it is known that it consists merely in making the natural draft stronger—not forcing but inducing it.



STACKS 200 OR 300 FEET HIGH.

Would give somewhat similar results. The SERVE TUBE is even more simple. SEE THOSE RIBS—they present 70 per cent. more heating surface than plain tubes. Smoke is unconsumed carbon, the essence of the coal. Watch the smoke stack of your steamer.

WHY PAY FOR THE SMOKE WHEN YOU CAN BURN IT?

For full information and prices write

THE GLOBE IRON WORKS COMPANY, CLEVELAND, OHIO.

Lake Type of Car Ferry for Siberia.

In August, 1895, the Review referred at some length to negotiations then pending between the Detroit Dry Dock Company and the Russian government for the construction of car ferries, similar to those at the Straits of Mackinac, to be used in connection with Russia's great enterprise, the Siberian railway, for transporting passenger and freight cars across Lake Baikal in Siberia. A map of Siberia was published, showing progress of the railway and the location of Lake Baikal, which is about the size of Lake Erie. Russian engineers had been to the lakes and had examined the ice-crushing car ferries at the straits, as well as those of the Ann Arbor company on Lake Michigan, and while the negotiations referred to were under way, Messrs. Frank E. Kirby and Gilbert N. McMillan visited St. Petersburg in the interest of the Detroit company. But the contract for the first of these car ferries went to Sir W. G. Armstrong & Co., of Newcastle.

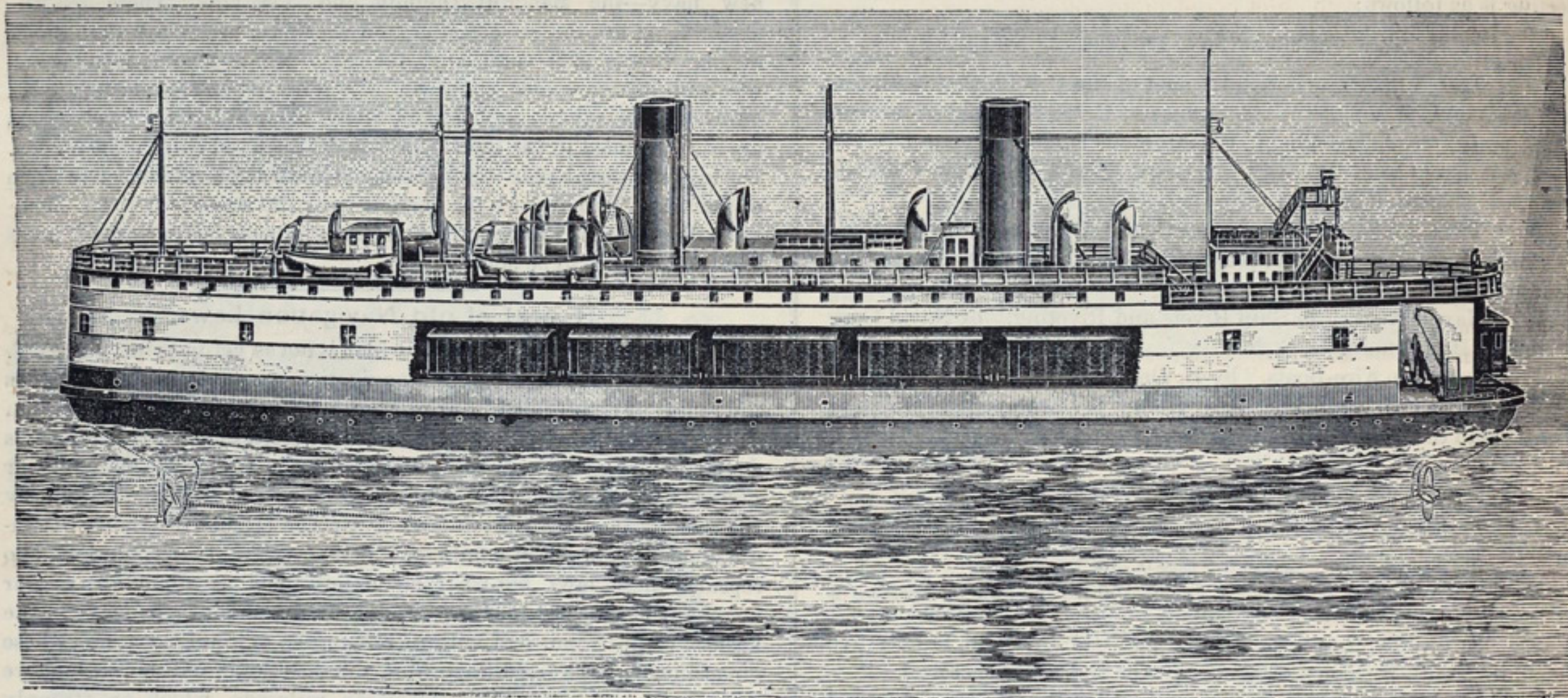
A picture of the boat just completed by the English company is presented herewith. It will be noted that the Russian government has adopted the same type of boat that is in use on the lakes, but instead of being built of wood with heavy steel girders, steel strapping, etc., it is of steel, and will be transported in small parts from England to Siberia, there to be put together on a floating pontoon dock, so as to obviate the necessity of provision for launching.

The Engineer of London says of this car ferry and the service in which she will be engaged: "For more than half the year Lake

state rooms and a private saloon, in addition to large public saloons or waiting-rooms. There are three sets of triple expansion engines working at a pressure of 160 pounds. Two sets drive twin propellers fitted, as usual, at the stern, and the third a propeller at the bow of the vessel. The last is for the purpose of disturbing the water under the ice, so as to assist the heavy steel stem to break up the solid field of ice, that it may be pushed aside by the advancing vessel. This large vessel of 4,200 tons displacement has been constructed in less than six months, taken down and packed on an ocean steamer for shipment to St. Petersburg; from there railway cars will convey the material to the furthest accessible point on the Siberian railroad, whence the rest of the journey to Baikal will be accomplished on sledges. A naval architect employed by the Siberian railway is already at Lake Baikal making preparations for the reception and the erection of the parts of the steamer. In view of the great difficulties of transport, the weight of each portion of the vessel and machinery has been reduced to a minimum. The boilers are considerably the heaviest items, but the weight has been kept below twenty tons apiece."

Interesting Facts Regarding Divers.

The dress of a fully equipped diver of the present day weighs 169½ pounds and costs about \$500. First of all comes 8½ pounds of thick underclothing; then follows the dress itself, weighing 14 pounds; boots 32 pounds, monstrous things with leaden soles; breast



ICE-CRUSHING CAR FERRY BUILT FOR SERVICE IN SIBERIA.

Baikal is frozen, and provision has had to be made in the vessel for breaking ice, which will probably be some feet in thickness. The form of the vessel has been designed to meet this requirement, and the lines are arranged so as to offer the least possible resistance to motion through the ice. The stem and stern consist of heavy steel castings, which will concentrate on a small surface the momentum of the vessel, and inflict on the ice the severest shock possible with the means at command. The hull is of course abnormally strong and heavy. The frames are of deep channel section, and very closely spaced. A belt of plating one inch in thickness and some 9 feet in width extends from stem to stern at the water line, and generally speaking, every constructional detail has been worked out so as to offer the greatest resistance to the pressure of the ice. The material of the hull is Siemens-Martin steel. The dimensions are 290 feet by 57 feet, and the draught of water under ordinary working conditions is 18 feet 6 inches. The principle of water-tight subdivision has been carried very far, so that the vessel must be pierced in several compartments before she is in danger of sinking, and in addition to the usual water-tight bulkheads, an inner bottom is fitted. The cars are run over a hinged gangway onto the railway deck, where they are securely fixed in position by means of special appliances. Accommodation for the passengers is provided on the decks above, and consists of several private

and back weights, 80 pounds; and, lastly, the helmet, which weighs 35 pounds. When the hull of the Great Eastern was cleaned by divers as she was being loaded with the cable for the Indian submarine telegraph, the contract price for the work was \$9,000, and it was completed in six weeks by twelve divers. The incrustation on her bottom was more than a foot thick, and after it was removed she lifted fully 2 inches. The greatest depth at which a diver may safely work is thought to be about 150 feet. There have been, however, rare instances of diving to 204 feet, and sustaining a pressure of 88½ pounds on every square inch on the body of the diver. Diving was first incepted by the action of the elephant in crossing a deep river, when he swims beneath the water, elevating his trunk, by which method he breathes. The flag ships in the British navy carry eight divers, and the cruisers four each, fully equipped.—Strand Magazine.

To California on the Nickel Plate road—Our service, time, and rates are not excelled. Our fast western express makes direct connections with the California limited from Chicago every day; also our night express due at Chicago at 7:40 a. m., daily. All details cheerfully explained by agents at depots, or Cleveland city ticket office, 224 Bank street, 379-Nov. 20

Largest Tow Barge on Fresh Water.

In selecting the steel tow barge James Nasmyth as a pattern for the new boat to be added to the Rockefeller fleet, the management of the Bessemer Steamship Co. has extended a compliment to F. W. Wheeler & Co. of West Bay City, Mich., builders of the Nasmyth. The boat built at West Bay City was selected first on account of her size (she is the largest schooner or tow barge on fresh water), but Mr. L. M. Bowers, manager of the Bessemer company, says that he had another point in view, and that was the completeness of her outfit.

The West Bay City company has been complimented on several occasions for a very liberal disposition in fitting out new boats, and in the Nasmyth, as well as in the other Rockefeller steamer and barge which they have just completed, the matter of outfit and general equipment has been carried almost to extremes. The captains' quarters includes even a small safe for books, papers, etc.

Principal dimensions of the Nasmyth are: Length over all, 380 feet; length on keel, 366 feet; beam moulded, 44 feet 6 inches; moulded depth, 26 feet. She is constructed on the channel system, and has a double bottom divided into six compartments, having a total capacity of about 1,500 tons of water ballast. There are two water-tight bulkheads, one forward and one aft, extending up to the main deck. The hold is divided into three compartments by two screen bulkheads. She is single-decked, being designed for bulk freight only. Her hold beams are placed every 8 feet apart, and forward and aft there is a steel deck. She is rigged with three pole spars and carries four sails. Her deck house aft with pilot house on top of same is of steel, as is also the towing machine house forward.

The after cabin gives accommodation to captain, mate, engineer and steward. The finish of these rooms is in hard wood, the captain's room being panelled in birch. The furnishings throughout are of the usual style supplied by Wheeler & Co. The dining room, galley and refrigerator are located on the main deck, directly aft of boiler and divided from the same by a steel bulkhead. The boiler room is 20 feet long and extends the full width of the ship. Here are located a Williamson steam steering engine, an electric light plant having a capacity of 150 lights, a boiler feed pump and ballast pump of the Dean Bros. type, with cylinders 12 and 16 inches by 18 inches stroke, connected to each compartment of the double bottom with separate suction and filling pipes. The pipes have all the necessary valves for filling and emptying the compartments of double bottom separately or all together.

The boiler is of the cylindrical return-tubular type, 8 feet diameter by 10 feet long, and carries a pressure of 120 pounds per square inch. The vessel is equipped with the steam towing machine, steam windlass and three capstans of the American Ship Windlass Co.'s make. She is also supplied with two 3,500-pound stockless anchors of the Vulcan type and has a 1,200-pound Kedge anchor placed aft. On the spar deck amidships is fitted a double-cylinder steam hoisting engine, and forward on top of towing machine house there is an auxiliary steam steering wheel for use in the rivers. The Nasmyth is, in fact, fitted with everything to insure safe navigation, comfort and the rapid handling of cargoes, and is in all respects a modern freighter. She is commanded by Capt. W. J. Hunt.

Decision in the Passaic Case.

Judge Coxe of the United States district court, northern district of New York, has filed his opinion in the case of Thomas A. Murphy against the steambarge Passaic and her tow, the barges Elma, Hattie, W. B. Jenness and the Superior. In November, 1890, Mr. Murphy was preparing to raise the schooner Tremble and cargo sunk near the head of St. Clair river, and had made some progress. On the evening of Nov. 8 his schooner, Ben Hur, used in connection with the work, was anchored at the wreck, when the Passaic and tow came along. The last barge in the tow, the Superior, collided with the Ben Hur, causing her to sink directly upon the submerged schooner Tremble and rendering both total losses. The amount claimed for the loss of the Ben Hur and submerged schooner Tremble and the wrecking outfit is something like \$35,000.

Judge Coxe gives a decree in favor of Mr. Murphy and against the Passaic for half damages and costs. The barges in tow were impleaded with their steamer, but as to them the libel was dismissed, no fault being shown against them. The Passaic was held at fault in that her master in her navigation, did not sufficiently consider the position of the Ben Hur, and the character of his tow, conditions call-

ing for the utmost caution. That he was not "particularly solicitous for the safety of his tow," the court says, "is demonstrated by the fact that he was ignorant of the collision until he stopped at the docks at Port Huron."

As to the Ben Hur (the schooner sunk) her fault consisted in occupying the position she did, on a stormy night, "so tied up that it was impossible to move her." * * "She occupied a most dangerous position. On a calm, clear night, or even in broad daylight she was a menace to passing vessels. To lie where she did on the night in question was unquestionably negligence." The night was dark, and a ten-mile breeze was blowing diagonally across the river, and the tendency of the tail of the tow to swing across was as well known to one as the other, and her owner took the risk of leaving the Ben Hur anchored there on such a night, when, without serious inconvenience, he could have moved her. The case will probably be appealed by one or both parties.

Ellis & Eaves Induced or Suction Draft.

Editor Marine Review:—Thanking you for the complimentary notice of the success of the Ellis & Eaves system of induced or suction draft on the steamer Waldo in your issue of Oct. 22, permit me to correct a statement, which as you have expressed it, might lead your readers to suppose that the exclusive right granted the Globe Iron Works Co. of your city to use and dispose of the Ellis & Eaves draft on the great lakes, included also the exclusive right to use our Serve ribbed tubes and Purves ribbed furnace flues, which is not the fact.

We shall be most happy to supply our Serve tubes or Purves flues to any responsible parties desiring to use them on the great lakes, but such parties if they desire to use the Ellis & Eaves draft must arrange with the Globe Iron Works Co. for it. In other words, our arrangement with the Globe Iron Works Co. relates only to the use of the draft, which is not by any means developing its best results on the Waldo, and for the reason intimated by you, viz., that plain 2½-inch O. D. tubes are used, while our experience leads us to recommend 3½-inch O. D. Serve tubes with spiral retarders resting upon the edges of the ribs.

With this combination we are producing one indicated horse power on the steamer Kensington of the American line with 1.4 pounds of coal, and on the five-crank English steamer Inchmona with 1.07 pounds of coal. The Inchmona is carrying 5,000 tons of cargo at nine knots on a daily consumption of 11½ tons of coal, in Scotch marine boilers with a working pressure of 255 pounds. It is an indisputable fact that the stokeholds where the Ellis & Eaves draft is properly installed are cooler than the engine rooms, enabling the firemen to do much better work and more of it, than with any other system of draft known.

C. W. Whitney.

Manhattan Life Bldg., 64-68 Broadway,
New York, Oct. 26, 1896.

Winter Moorings at St. Clair.

Editor Marine Review:—I note the letter of a St. Clair correspondent relative to Pine river as winter quarters for vessels, and I would like to have the gentleman give us the clear width of the draw of the Front street bridge, which crosses Pine river near the mouth. We have considered the advisability of laying up a large steamer at this point, but have always supposed that there was a good deal less than 45 feet in the clear of the draw; otherwise there is not a better place on the whole chain of lakes to lay up a boat.

S. E. H.
Cleveland, Oct. 24, 1896.

During one week recently orders were received by the Sheriffs Mnfg. Co., Milwaukee for Sheriffs wheels as follows: Two of 5 feet 2 inches diameter for the steamer McEwan at New Orleans, La.; one of 7 feet diameter for the steamer Vanguard at New Orleans, La.; one of 38 inches diameter for a small steamer at Morgan City, La.; one of 6 feet 6 inches diameter for the tug Barnes at Manistee, Mich., and one of 6 feet diameter for the tug Carrie Ryerson at Muskegon, Mich. The Sheriffs wheel recently placed on the steel steamer John W. Moore has reduced her running time between Buffalo and Milwaukee twelve hours, which is certainly a most gratifying result both to the owners of the steamer and the manufacturers of the wheel.

Reduced rate tickets are offered for sale by the Nickel Plate road to points in Michigan, Wisconsin and the southwest for the benefit of hunting parties.

337 Nov. 1

Around the Lakes.

Mr. O. C. Pinney, marine lawyer, has taken up enlarged office quarters on the third floor of the Perry-Payne building, Cleveland.

C. D. Thompson of Port Huron will build a steambarge during the coming winter, making use of boilers and engines of the old tug Crusader.

The management of the Minnesota Steamship Co. is considering the advisability of adding 50 feet to the length of one or two of the smallest of their steel steamers during the coming winter.

Geo. F. Ely, who was secretary and treasurer of the Cleveland City Forge & Iron Co., since its organization, died suddenly in Cleveland, Wednesday. He was in his fifty-third year.

Sealed proposals for the wreck of the steamer Grand Traverse, sunk off Colchester reef, Lake Erie, in 30 feet of water, will be received by the Lackawanna Transportation Co. until Nov. 2. The bids will be opened at 2 o'clock on that day at the company's office at Buffalo.

The talk of the Grummond line purchasing the passenger steamer City of Milwaukee is probably not well founded. Officers of the Graham & Morton Transportation Co., who have had the Milwaukee under charter, have been trying to buy her, and if they succeed it is quite probable that the much-talked-of new Graham & Morton boat will not be built.

Illness has caused Capt. Peterson of the steamer J. J. McWilliams to leave his boat for the balance of the season. Capt. Stratton, whose boat in the Menominee line has been laid up, will take the McWilliams. Capt. Stewart of the steamer Samoa has also been compelled to leave his boat on account of illness, and Capt. Fury of the Shenandoah takes her for the rest of the season.

Another quick job of repairs was accomplished by the Globe Co., Cleveland, on the steamer Roman. In five and one-half days, forty-two bottom plates were taken off and put back, eighty-seven frames were removed and put back, forty-five floor frames were straightened up and eighteen new floor frames were put in. Part of the keel plate was also straightened and 10 feet of new keel put in.

Competition from the Grummond passenger line between Cleveland and Detroit is prompting plans on the part of the Detroit & Cleveland company for a double daily service between the two cities next season. It is proposed to have boats leave Cleveland and Detroit every day at about 9 a. m. and 11 p. m. Experienced steamboat men have claimed for some time past that first-class day service between Detroit and Cleveland could be made payable.

Treasurer Geo. P. McKay, Secretary Chas. H. Keep and probably counsel Harvey D. Goulder of the Lake Carriers' Association will visit Washington, this week, with a view to enlisting the support of the United States light-house board in behalf of liberal appropriations from the next congress for lights, fog signals, etc., for the lakes. The officers of the association have everything fixed as to what they would like to have in this regard if the appropriations can be secured.

Death has removed several well-known vessel men during the past week. After an illness of six weeks, Capt. Critchell, late master of the steamer D. C. Whitney, died at Marine City, Saturday morning, of typhoid pneumonia. Capt. Critchell was fifty-five years of age. H. N. Wadleigh, one of the oldest of lake marine engineers, died at St. Luke's hospital, Chicago, on Sunday, aged fifty-nine years. The Lehigh Valley steamer Tuscarora was the boat on which Mr. Wadleigh was last engaged. He served under Farragut during the late war and had seen thirty-five years' service with various steamship lines. From Grand Haven the death of Capt. Howlett is announced. When Grand Haven was an important lumber shipping point he owned a number of lumber vessels. He was ninety years of age. The latter years of his life were spent with his son-in-law, Capt. Wm. Loutit.

A preliminary survey has been made of an available site for the proposed model tank at Washington navy yard. A plain, substantial building, 40 or 50 by 500 feet, will be erected to protect the tank from the weather, and within will be the water-tight box surrounded by an electrical device like a trolley for towing the miniature ships around the course.

The German naval authorities have given the Yarrow of London, England, an order for several torpedo boat destroyers of a new type, with a speed of twenty-eight knots.

Lights, Fog Signals, Shoals, Etc.

Capt. Geo. P. McKay of Cleveland is still receiving letters from vessel masters thanking the Dominion government and the Lake Carriers' Association for the gas buoys recently placed in Pelee passage, Lake Erie. "We will have to do no guessing when in that vicinity now," says Capt. Geo. J. Bennett of the steamer Cleveland. Capt. M. P. Parsons of the steamer W. H. Gratwick No. 1, says the buoys are of special advantage to up-bound vessels. He adds that they will save several tons of fuel during the season to each steamer on the lakes. Capt. B. D. Townsend of the steamer R. L. Fryer says that under ordinary conditions the buoys are visible day or night, at a distance of five miles.

In the latest "Notice to Mariners" the hydrographic office directs special attention to the shoal which lies $1\frac{1}{2}$ miles (statute) E. S. E. from Gray's reef light vessel, Lake Michigan. The least depth of water over this shoal in August, 1895, was 23 feet. It is about 1,000 feet in diameter. This same publication gives the location of ledges off the east ends of Green and Rattle snake islands, and two shoals in the channel between North Bass and Big Chicken islands, Lake Erie. It was the intention of the hydrographic office to have issued a sketch chart of the west end of Lake Erie showing these rocks and shoals, but the information of their discovery was received too late. The regular charts in the branch hydrographic offices will be corrected according to this information, however, and will be held for the free inspection of lake mariners.

Four buoys have been placed to mark the new cut at the Encampment, St. Mary's river, and as far as can be learned the location of them is in all respects satisfactory to vessel masters, but as yet steel vessels in the Lake Superior trade are not loading below 16 feet.

Dredging in Portage Lake ship-canals is keeping pace with the St. Mary's river improvements. It is announced that only a little more dredging is required to give a general draft of 16 feet in the canals, and that only soft mud has been found anyhow, so that no great damage could be done to vessels laden to 16 feet were they to ground.

It is understood that the boulder on which the steamer Roman struck some two months ago, and which was about 600 feet above Ballard's reef light-ship, Detroit river, in the west half of the channel, has been removed. There is now a depth of 20 feet of water over the spot. There was about 16 feet over it when the Roman struck.

Artistic Photographs.

A Cleveland vessel owner who has made a large collection of artistic photographs called at the office of the Marine Review, and after looking over the photographs which our photographer obtained recently in the Detroit river near Bois Blanc island, he bought eight of them. Any one making a collection of marine photographs can not afford to ignore this lot of pictures—print size 11 by 14 and paper size 14 by 17 inches. If several prints are desired for examination they will be forwarded to any address on the understanding that return express charges will be paid if they are not satisfactory. No one will make a mistake, however, in ordering the panoramic view of Bois Blanc island, the Lime Kilns and Amherstburg, which is 11 by 28 inches—\$3 mounted, \$2.50 unmounted, \$5 with a matt and frame, or \$6 mounted on a handsomely finished oak board. Another view 11 by 14 inches showing Bar point light and some sixteen vessels between the point and Bois Blanc island, the whole picture giving a grand idea of the volume of lake commerce, will no doubt have a large sale. The Tuscarora and Centurion are leading the up-bound fleet in this picture. The price is \$1.50. Among other prints the Schuylkill, Sir Henry Bessemer, S. S. Curry, Thos. Cranage, Italia, Frank E. Kirby, Masaba, J. J. McWilliams, Maricopa, I. W. Nicholas, Northern Light, Scranton, Tuscarora, L. C. Waldo, Yale and Zenith City may be said to be the most artistic. The price for single prints is \$1.50; when more than three are ordered, \$1.25.

Contracts for pleasure boats, several of them of the costly steel steam yacht kind, are plentiful at the works of the Gas Engine & Power Co., Morris Heights, N. Y. Orders now on hand include a steel steam yacht 170 feet long and of 18 miles guaranteed speed for Charles Fleischman; a cruising yacht 85 feet long with triple expansion engines, Seabury water tube boiler, etc., for E. S. Woodward of New York; a twin-screw naphtha yacht 65 feet over all with fuel capacity for 500 miles running; 40-foot steam launch of 10 miles speed for export to Mexico; also a 40-foot cabin naphtha launch and several smaller pleasure boats.

Capt. McDougall and the St. Lawrence Canals.

Having come into possession of a good photograph of Capt. Alex. McDougall, inventor of the whaleback type of ship, the Review was prompted to reproduce it in the engraving that appears herewith. Whatever may be said of the great whaleback enterprise, with which Capt. McDougall's name has been so prominently connected,



it is certain that he is a man of a very active mind. For a great many years he has watched with special interest the progress of work on the St. Lawrence canals, which are being completed to dimensions equal to that of the Welland canal. His special interest in this work is due to a belief that boats of Welland canal size, about 260 feet long and of 14 feet draft, and especially vessels of the whaleback type, can be built suitable to ocean traffic. It is expected that this Canadian canal work will be completed about two years hence, and it would not be surprising to then learn of a strong effort on the lakes to have the United States government subsidize American-built ships for this trade.

Screw Propeller Designing.

A communication in the Review of Sept. 24 from Sir C. Purcell Taylor, Bart., D. Sc., of 2 Poweis Place, Queen Square, London, refers to a book on "Screw Propellers" by I. McKim Chase, published in New York. Attention is directed to this sentence in the book: "It is very doubtful whether there will ever be devised a formula that can universally be applied to determine the best form and the most advantageous dimensions for a screw propeller under any given set of conditions." Mr. Taylor says this is a mistake, as he worked out such a formula three years before Mr. Chase's book was published. He adds that it is quite probable that no mention of his system appeared in American papers, or Mr. Chase would have heard of it.

A similar criticism of the sentence referred to in Mr. Chase's book appeared also in the Engineer of New York. In answer to it Mr. Chase, writing from Washington, D.C., admits that he has not seen the London gentleman's formula but he defends the sentence in his book with the following statement: "This sentence was written with deliberation after patient investigation as to the different methods used by the most successful designers. Some guarded their formulas with great jealousy. In cases where sufficient data of the performances of the vessels and screws could be obtained, their methods could be analyzed with reasonable accuracy. In all cases of the best practice the formulas used were found to be empirical. For many years the writer occupied a position where experiments with screw propellers were almost continuously going on and where he had the best opportunity to acquire accurate information regarding their results. When

he did not make the instruments himself he supervised them, consequently he was able to know any peculiarity of their construction. Although he labored to do so, he was never able to devise a satisfactory formula covering the conditions imposed by the sentence quoted above, but he was early convinced of one fact—that any such formula must include as a factor the inertia of the water acted upon by the screw. What is here meant by the term inertia is that resistance which the water acted upon by the screw offers to being put in motion from a state of rest. The theory upon which he based this advocacy has since been substantiated by the experiments of Maxim and Langley with aeroplanes. This conviction led the writer to advocate smaller and more rapidly revolving screws for high speeds, as well as deeper immersion, which these conditions made possible. In this advocacy he was opposed by the received dynamical teachings, and also, in a measure, by those on screw propulsion of that eminent scientist to whom the engineering profession is so much indebted, the late Prof. Rankine, whose enunciation that that screw is the most economical which moves the largest body of water astern with the smallest velocity, had come to be regarded as an axiom. Nevertheless it can not be denied that the constant tendency of good practice in screw propulsion during the last fifteen years has been in the direction above indicated."

Owego—Oglebay Race.

Editor Marine Review:—I notice in one of the marine papers that Capt. Hutchinson of the steamer Oglebay thinks he can beat the Owego because he beat her twenty minutes on Lake Michigan when he was running at his best speed, while the Owego had only part of her boilers under steam. I notice, too, that he thinks that he can go eighteen miles an hour. Tell him to take off four miles and then he may be near right if he drives his boat as hard as he can. The Owego is today, as she has been ever since she came out, the fastest freight boat on freshwater.

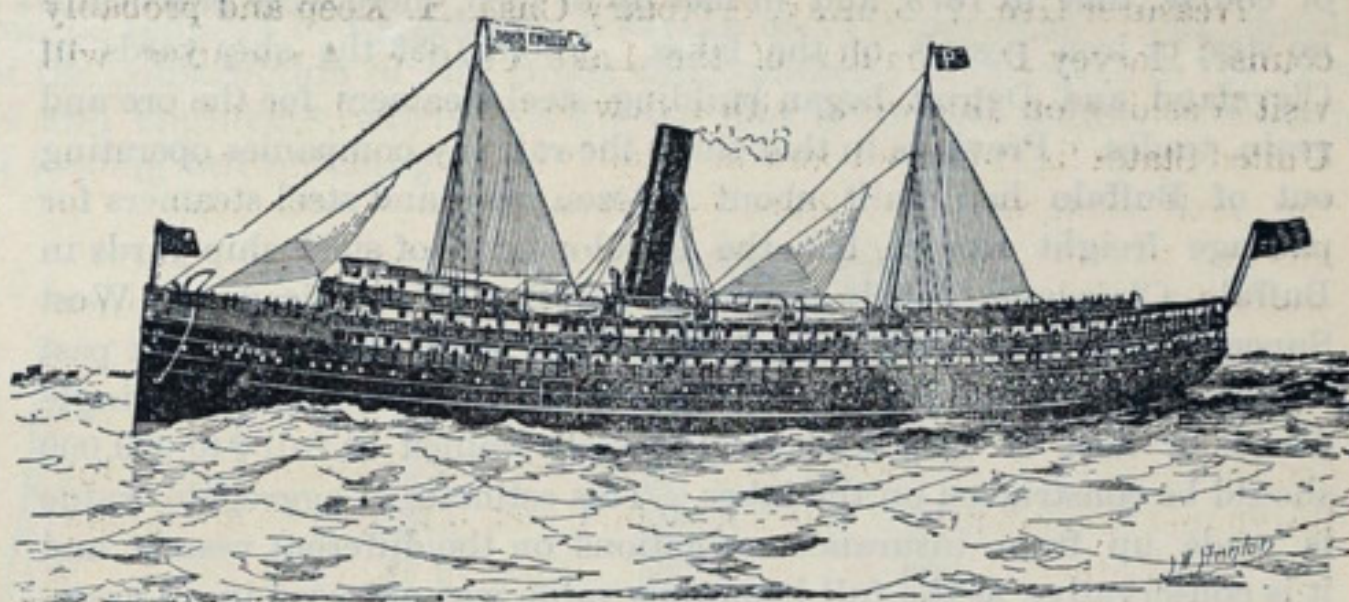
Buffalo, Oct 24, 1896.

Edward Gaskin,

Union Dry Dock Co.

Freight and Passenger Steamer John Englis.

The John Englis, a steamer costing about \$400,000, was launched at Roach's ship yard, Chester, Pa., on Saturday last. She is the 129th vessel built at this yard. A small engraving of the steamer is presented herewith. She will be owned by the Maine Steamship Co. and will be used for passenger and freight service between New York and Portland. The John Englis will have 126 state rooms for passengers and a freight capacity of about 2,000 tons. It is expected



that she will make 18½ miles an hour in regular service. She is 313 feet long and 46 feet beam. Her triple expansion engine, with cylinders 30, 48 and 75 inches in diameter, and 56 inches stroke, will be driven by six forty-ton boilers, carrying a pressure of 180 pounds of steam to the square inch, and the horse power to be developed will be in excess of 4,000. Boilers are fitted with eighteen Purves ribbed steel furnace flues of 40 inches inside diameter by 8 feet 11 inches long by 9-16 inch thick, to stand a working pressure of 190 pounds per square inch.

Cargoes through the Welland canal are, as is well known, limited by a draft of a little less than 14 feet. It is important therefore to note that the whaleback steamer Bartlett and her consort, the barge 111, have just passed down the canal carrying 71,500 bushels and 36,000 bushels respectively.

Captains and mates are invited to call at the office of the Review and look over a handsome collection of photographs of lake steamers.



DEVOTED TO LAKE MARINE AND KINDRED INTERESTS.

Published every Thursday at No. 409 Perry-Payne building, Cleveland, Ohio, by John M. Mulrooney and F. M. Barton.

SUBSCRIPTION—\$2.00 per year in advance. Single copies 10 cents each. Convenient binders sent, post paid, \$1.00. Advertising rates on application.

Entered at Cleveland Post Office as Second class Mail Matter.

The books of the United States treasury department on June 30, 1895, contained the names of the 3,342 vessels, of 1,241,459.14 gross tons register in the lake trade. The number of steam vessels of 1,000 gross tons, and over that amount, on the lakes on June 30, 1895, was 360 and their aggregate gross tonnage 643,260.40; the number of vessels of this class owned in all other parts of the country on the same date was 309 and their tonnage 652,598.72, so that half of the best steamships in all the United States are owned on the lakes. The classification of the entire lake fleet on June 30, 1895, was as follows:

	Number.	Gross Tonnage.
Steam vessels.....	1,755	857,735.13
Sailing vessels	1,100	300,642.10
Unrigged.....	487	83,081.91
Total.....	3,342	1,241,459.14

The gross registered tonnage of the vessels built on the lakes during the past five years, according to the reports of the United States commissioner of navigation, is as follows:

Year ending June 30, 1891.....	204	111,856.45
" " " 1892.....	169	45,968.98
" " " 1893.....	175	99,271.24
" " " 1894.....	106	41,984.61
" " " 1895.....	93	36,352.70
Total.....	347	335,433.98

ST. MARY'S FALLS AND SUEZ CANAL TRAFFIC. (From Official Reports of Canal Officers.)

	St. Mary's Falls Canal.			Suez Canal.		
	1895*	1894	1893	1895	1894	1893
No. vessel passages.....	17,956	14,491	11,008	3,434	3,352	3,341
Tonnage, net registered.....	16,806,781	13,110,366	9,849,754	8,448,383	8,039,175	7,659,068
Days of navigation.....	231	234	219	365	365	365

* 1895 figures include traffic of Canadian canal at Sault Ste. Marie, which was about 1/4 per cent. of the whole, but largely in American vessels.

Noonday meetings of business men, to discuss the question of finances, which is now of absorbing importance, are being held in Cleveland. In preparing for an address on the day designated as "marine day," Hon. R. C. Parsons, who was at one time the representative of the Cleveland district in congress, and who has always shown great interest in lake shipping, asks the Review a question that directs attention to the great value of steel vessels built on the lakes within the past ten years. He asks for the number, tonnage and value of steel and iron vessels owned on the lakes in 1873, as against the number, tonnage and value of such vessels at the present. Vessel men know, of course, that in 1873, and in fact up to 1886, there were practically no steel or iron vessels on the lakes. About 1886 the ship yards of Cleveland and Detroit began building steel steamers for the ore and grain trades. Previous to that time, the railway companies operating out of Buffalo had built about a dozen iron and steel steamers for package freight service, but the development of steel ship yards in Buffalo, Cleveland, Toledo, Detroit, West Bay City, Chicago and West Superior dates practically from 1886. Their work previous to the past ten years was insignificant. It is wonderful therefore that in a single decade a fleet of iron and steel vessels valued at full \$40,000,000 should be constructed on the lakes. This estimate of aggregate value is made up from insurance valuations on the different vessels, and it is conservative, as the full insurance value was not used in all cases. The number of steel and iron vessels owned on the lakes on June 30, 1896, was 226 of 380,988 gross tons. Of these vessels thirty-seven of 50,289 tons were sail, and 189 of 330,699 tons were steam. These figures are from reports of the United States commissioner of navigation and are exact. Additions to the fleet since June 30 of this year would bring the total of iron and steel vessels owned on the lakes at present to about 240 and their gross tonnage to about 420,000.

A correspondent asks this question with reference to steamboat regulations: "Kindly inform me as to whether an owner or managing owner can demand a special license as master and sail his steamer on that license, provided he has two first-class pilots with him. This argument arose through a friend of mine getting a license to sail his own yacht. He claims that the same rule applies to large freight or passenger steamers, with the proviso that there be two first-class pilots under him." The yacht owner referred to is very probably mistaken. Special licenses are issued for pleasure boats under 100 tons that can not in any way be applied to freight or passenger

steamers above that tonnage. On the Mississippi and Ohio rivers officers who would be called pursers or clerks on the lakes act as captains, in the sense that they look after the commercial affairs of the boats, but there is nothing even of this kind on the lakes. Here the captains of steam vessels, excepting those in the class under 100 tons to which special licenses are issued, must be pilots. Their papers may be limited in cases where they are on special routes, but they must in all cases be men of certain experience satisfactory to the inspectors who are governed by fixed rules.

Frank A. Flower of West Superior, Wis., secretary of the International Deep Waterways Association, has just seen a copy of the Blue Book of American Shipping, published by the Marine Review. He writes: "Upon receipt of your Blue Book, I sat up until 1 o'clock at night reading and enjoying it. You have gathered within its covers the widest range of marine information I ever came across. I hope you will continue its annual publication. If that should be your intention, draw on me at any time for information in your behalf and I will be pleased to give you anything I have. Send a copy of the book to President McKinley; a copy to Gov. Ed. Schofield, Oconto, Wis., and another to the State Historical Society, Madison, Wis."

The Marine Journal of New York gives up a couple of columns in its last issue to declaring that the treaty which prevents the building of war vessels on the lakes is out of date and should be abrogated. On several occasions of late the newspapers of nearly every city on the lakes, assisted by leading members of congress, have united in making this same declaration, but they have accomplished nothing. Probably the journal has a tip on the probability of matters being ripe at Washington just now for agitation of this subject. If such is the case there will be no lack of assistance from lake newspapers, congressmen, ship builders and others who would like to see the restriction removed.

Mr. H. H. A. Jones of the Dominion cruiser Petrel, to whom the Review is indebted for the explanation of the semaphore system of signals which appeared in our last issue, has kindly agreed to supply any additional information that may be desired regarding these signals. During the winter months, captains or mates would profit by practicing the exchange of these signals in the rooms of the beneficial organizations of which they are members. After Dec. 1, Mr. Jones' address will be Owen Sound, Ont.

From the grain business that has developed at Chicago and Duluth thus far this fall, it is evident that the closing months of the season would have witnessed high freights, with big profits to vessels, but for the depressing effect which the political disturbance has had on the iron industry.

When will quadruple expansion engines with higher steam pressures be applied to lake freight steamers? Our ship builders were not behind the builders of other countries in adopting triple engines for the coarse freight carriers, even if these vessels are sometimes called freight barges.

The list of vessels in the Lake Carriers' Association now numbers 393 steamers and 220 schooners and barges, or a total of 613, all of which are the best type of vessels on the lakes.

Stocks of Grain at Lake Ports.

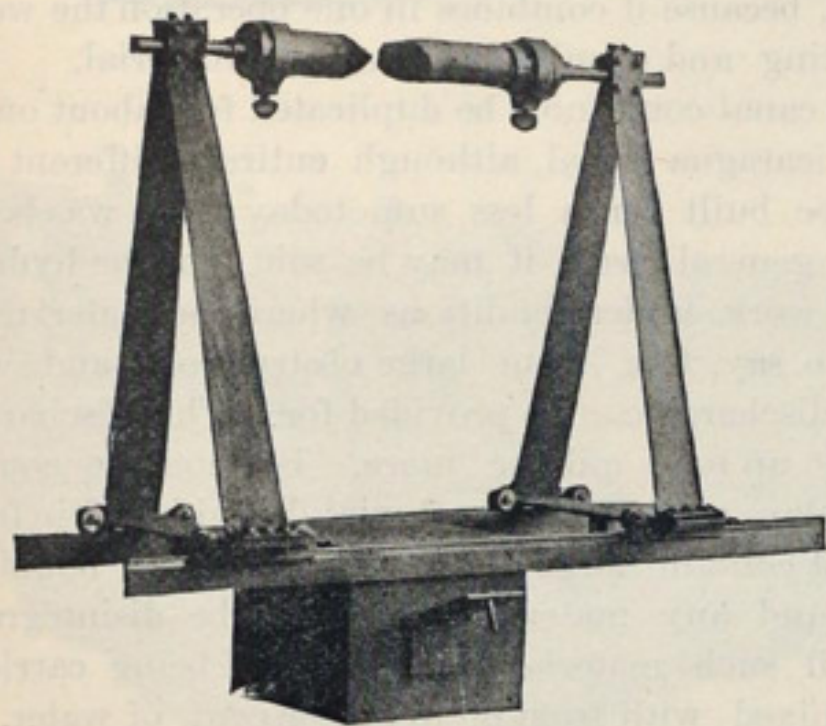
The following table, prepared from reports of the Chicago board of trade, shows the stocks of wheat and corn in store in regular elevators at the principal points of accumulation on the lakes, Oct. 24, 1896:

	Wheat, bushels.	Corn, bushels.
Chicago	15,896,000	7,996,000
Duluth	5,195,000	32,000
Milwaukee	377,000	4,000
Detroit	469,000	46,000
Toledo	758,000	34,000
Buffalo	1,840,000	847,000
Total.....	24,535,000	8,959,000

As compared with a week ago, the above figures show, at the several points, named an increase of 217,000 bushels of wheat and 1,322,000 bushels of corn.

Development of the Electric Search Light.

The development of the electric search light is a fair example of the effect of specializing in manufacture, and the manner in which in a little over a year, this formerly intricate and costly apparatus has been perfected and reduced in cost, is certainly wonderful. Until this year there were no real search lights in use except in the navy, and the naval lights were clumsy and complicated. They possessed the single redeeming feature of the costly lenses imported from



France, which were so expensive that only a rich government could stand the luxury. Realizing that there was a demand for a good search light if sold at a low price, Mr. S. W. Rushmore investigated the subject. He found that the old method could not be employed in making the large lenses that were required, except at enormous cost, and after years of study and experiment, he succeeded in producing the special glass castings required, and perfected a machine for finishing them that brought the cost to but a fraction of that involved in the old methods. He also perfected a lamp mechanism, which, while containing fewer parts than the common street lamp, will feed the heavy carbons toward or away from each other with scarcely a volt variation, and keep the light in perfect focus. This is claimed

enormous power, and sell at such low prices, that they are already in extensive use on naval and merchant vessels in all parts of the world. They are now used on most of the steamships of leading lines on the coasts and on the great lakes. A number of wide-awake advertisers have been quick to appreciate the value of these lights, and many of the tall buildings in the large cities are already equipped with powerful lights that throw their rays for miles around and attract the attention of all who may be out of doors. One of these projectors of large size is mounted on the lofty tower of the great department store of Seigel, Cooper & Co., New York City, which burns every night and throws a beam visible over eighty miles in all directions.

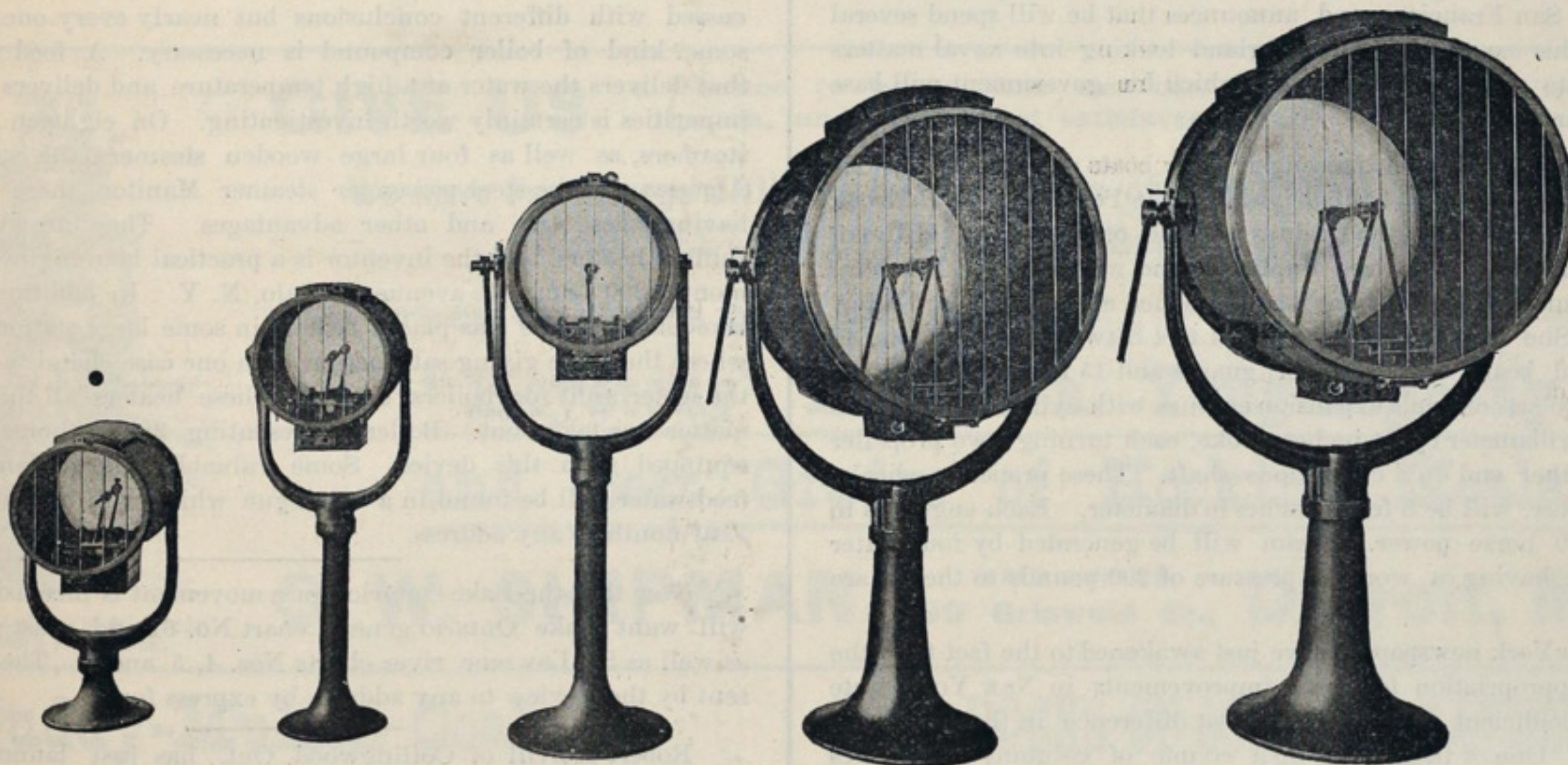
More Big Cargoes.

Although two of the big Rockefeller ships have moved cargoes of 5,200 tons from Lake Superior, the draft in both cases has lacked a few inches of being 16 feet. The Zenith City's big cargo of 289,000 bushels of oats is 42,396 bushels in excess of any cargo of oats ever before moved on the lakes.

Iron ore—Coralia, Mutual Transportation Co. of Cleveland, 5,088 gross or 5,699 net tons, Gladstone to Ashtabula, draft of 16 feet 10 inches. From Lake Superior—Steamer Sir Henry Bessemer, Bessemer Steamship Co. of Cleveland, 4,637 gross or 5,194 net tons, Ashland to Conneaut, draft of 15 feet 9 inches.

Grain—Steamer Queen City, A. B. Wolvin of Duluth, 207,000, bushels of corn, equal to 6,210 net tons, Chicago to Buffalo, 16 feet 8 inches draft; steamer Maricopa, Minnesota Steamship Co., Cleveland, 191,700 bushels of corn, Chicago to Buffalo; steamer Zenith City, A. B. Wolvin of Duluth, 289,000 bushels of oats, Chicago to Buffalo. From Lake Superior—Steamer Sir William Siemens, Bessemer Steamship Co. of Cleveland, 174,500 bushels of wheat, equal to 5,235 net tons, Duluth to Buffalo, draft of 15 feet 9 inches.

Coal—S. S. Curry, Hawgood & Avery Transit Co. of Cleveland, 4,535 net tons bituminous, Conneaut to Gladstone; Selwyn Eddy Eddy Bros. of Bay City, Mich., 4,252 net tons anthracite, Buffalo to Milwaukee.



to be the only arc lamp in use that feeds the carbons in both directions while having no motors or contact devices of any kind. This lamp, shown in figure 2, with the new lense mirror mounted in a sheet metal cylinder, forms the modern high power projector as made by the Rushmore Dynamo Works of Jersey City, N. J. The large illustration shows a line of these projectors from 10 inches to 34 inches in diameter, and of capacity from 5 to 150 amperes. Other forms of these projectors are made for placing on the roof of the pilot house, with attachments below to be operated by the pilot, and others of the larger type, used chiefly in the navy, have a small motor in the base with wires leading to a small controller, which may be placed at any distance. With this arrangement the operator, in a place of shelter, and at a point removed from the intense beam of light, may see the distant object much more readily. These lights are wind and weather proof and work perfectly in a gale. They are so reliable, and of such

Speed—Owego, Union Line of Buffalo, Buffalo to Chicago, 889 miles, 54 hours and 16 minutes, 16.4 miles an hour; Centurion, Hopkins Steamship Co. of St. Clair, Mich., Buffalo to Duluth, 997 miles, 65 hours and 10 minutes, 15.3 miles an hour.

California is convenient. Comfort, speed and economy in rates are the distinguishing characteristics of the fast western express leaving Cleveland daily at 10:58 a. m. via the Nickel Plate road, and reaching Chicago at 9:00 p. m. same day, and our night express arriving at Chicago at 7:40 a. m. daily. Direct connections at Chicago with all the leading lines for Los Angeles, San Diego, and San Francisco. Through tickets and baggage checks. Sleeping car space and all details arranged by any agent of the Nickel Plate road. Cleveland city ticket office, 224 Bank street.

380 Nov. 20

The Review has excellent photographs of lake ships.

Low Cost of Producing Ore.

Everybody interested in Lake Superior mines is talking of the year's record at the Oliver, the greatest of the Mesabi steam shovel mines. Some figures printed in Duluth recently regarding cost of mining at this property are so low as to cause great doubt regarding their accuracy, and yet they are put in such a way as to indicate a reliable source. These figures show the mine to have run its 810,000 tons of this year's output for about 6½ cents a ton, exclusive of stripping, which is set down at not over 3 cents on a total ore body to be mined by the shovels. While this is probably too low, it gives an idea of the exceedingly low cost of mining that has been enjoyed by the Oliver this summer. In this connection it is interesting to note that the management of the mine has determined to mine their entire ore body by steam shovels, and that it is not considered necessary to make provision for any change to either milling or other underground process later. Ore will be raised out of the mine, when its level shall have been sunk too far for present methods, by pneumatic elevators or stationary engines for lifting the loaded cars to the surface, or by running switchbacks or circular tracks down the mine. It is stated that some of the largest and best managed Mesabi mines operated underground by the caving process have shown cost sheets this year of not far from 40 cents, and ranging from 37 to 41 cents per ton, including everything. This figure is vouched for as accurate by one of the best known mining engineers in the Mesabi region.

In General.

"Blinker" and "twinkler" are the names applied to the gas buoy on the middle ground in Point Pelee passage. The name comes from the flash that is characteristic of the light.

Italy proposes to build within the next ten years twenty warships of various classes, one hundred torpedo boats, and ten auxiliary or harbor service vessels. This includes an expenditure of \$60,000,000 by 1907, and active discussion is going on concerning the maintenance of the fleet.

Commodore K. Martia, another representative of the Japanese navy, is in San Francisco, and announces that he will spend several months in this country and in England looking into naval matters with a view to making reports upon which his government will base plans for war ships.

Two twin-screw steel passenger ferry boats of large dimensions are under construction in Philadelphia for the Pennsylvania Railroad Co.—one at the yard of the Cramps and the other at Chas. Hillman & Co.'s yard. The boats are duplicates and will be called Pittsburg and St. Louis. The Pittsburg was launched at Cramps' yard a few days ago. She is 206 feet over all, 184 feet between rudder posts, 46 feet moulded beam, 65 feet over guards and 15 feet average depth. There are two sets of triple expansion engines with cylinders 20, 32 and 32 inches in diameter by 24 inches stroke, each turning two propeller wheels on either end on a continuous shaft. These propeller wheels, four in number, will be 8 feet 3 inches in diameter. Each engine is to develop 1,500 horse power. Steam will be generated by four water tube boilers, having a working pressure of 200 pounds to the square inch.

The New York newspapers have just awakened to the fact that the \$9,000,000 appropriation for canal improvements in New York state will not be sufficient to make any great difference in the size of the canal boats. One of them gives up a couple of columns to statistics covering the wonderful increase in St. Mary's Falls canal traffic originating in the northwest and adds this comment: "In view of this great volume of commerce it seems remarkable that all that New York proposes to do to retain the big grain traffic which comes to her through the lakes is to deepen the Erie and Champlain canals by only 2 feet. For the Empire state to have shown a curious indifference to her own business interests seems incredible indeed. New York business men seem to think that the traffic will come this way perpetually, no matter if the Erie canal is not improved. But it won't. There is a great empire west of Lake Michigan and Lake Superior which must have an adequate outlet, and if it can not get it through New York state it will get it down the St. Lawrence. In a few years there will be fifty million tons of freight pouring through the great lakes, and the urgent necessity brought about by such conditions will compel abrupt attention to the construction of an adequate outlet to the sea. The present is the time, however, to agitate the subject."

Hydraulic Dredging.

The special advantage of the hydraulic dredge is the transportation of the dredged material and its delivery at a considerable distance. Although it is especially applicable to land reclamation where the material has to be spread over considerable areas of low-lying land, it would seem that a great deal of work done with dipper dredges might be more economically accomplished with the hydraulic system. Land reclamation work is performed by the hydraulic dredge at a very low cost, because it combines in one operation the work of dredging, transporting and evenly spreading the material.

The Suez canal could now be duplicated for about one-third of its cost. The Nicaragua canal, although entirely different as to its conditions, can be built for a less sum today than was before thought possible. In general terms it may be said that the hydraulic dredge is adapted to work under conditions where the material is homogeneous, that is to say, free from large obstructions, and where a fluid or semi-fluid discharge can be provided for. This discharge may be at any distance up to a mile or more. By homogeneous material is meant sand, clay, earth, gravel, alluvial deposit, and, in fact, anything that does not contain large obstructions, such as boulders, roots or stumps, etc., and any material which can be disintegrated by plow or cutter. All such material is capable of being carried through a pipe, when mixed with from 60 to 90 per cent. of water, the amount that can be carried in suspension depending on the distance, velocity of flow and character of material. Stones and other objects of considerable size can be washed through the pipe; in fact, any solids can be carried that will pass through the openings in the pump. The form of pump commonly employed is the centrifugal. For dredging purposes this is made extra heavy. The internal passages should be large and free, and with curves of large radius. The interior of the pump is sometimes fitted with lining plates to take the wear and abrasion. This wear, however, is not great, and a well-designed dredging pump is about as durable as any other kind of dredging machine.—Cassier's Magazine.

The benefit of feed water heaters on lake steamers has been discussed with different conclusions but nearly every one agrees that some kind of boiler compound is necessary. A feed water heater that delivers the water at a high temperature and delivers it free from impurities is certainly worth investigating. On eighteen Anchor line steamers, as well as four large wooden steamers, the steel steamer America and the steel passenger steamer Manitou, there are heaters having these two and other advantages. They are known as the Buffalo heaters, and the inventor is a practical lake engineer, R. Learmonth, 200 Lafayette avenue, Buffalo, N. Y. In addition to those in lake steamers, he has placed heaters in some large stationary plants, where they are giving satisfaction. In one case chemists pronounced the water unfit for boilers but with these heaters all the deleterious matter was taken out. Boilers representing 28,000 horse power are equipped with this device. Some valuable information concerning feed water will be found in a catalogue which will be mailed by Mr. Learmonth to any address.

Now that the Lake Ontario grain movement is increasing, masters will want Lake Ontario general chart No. 61 and coast chart No. 1, as well as St. Lawrence river charts Nos. 4, 5 and 6. The five will be sent by the Review to any address by express for \$2.

Robert Morrill of Collingwood, Ont., has just launched a small steam vessel. Her dimensions are 92 by 16 by 7½ feet.

In a large number of cases the Blue Book of American Shipping has been sent on approval to ship owners, ship builders, marine engineers and others interested in shipping. In every case the price of the book, which is \$5.00, has been remitted immediately.

Hunters' excursion rates are offered by the Nickel Plate road to points in Michigan, Wisconsin and the southwest. 339 Nov. 1.

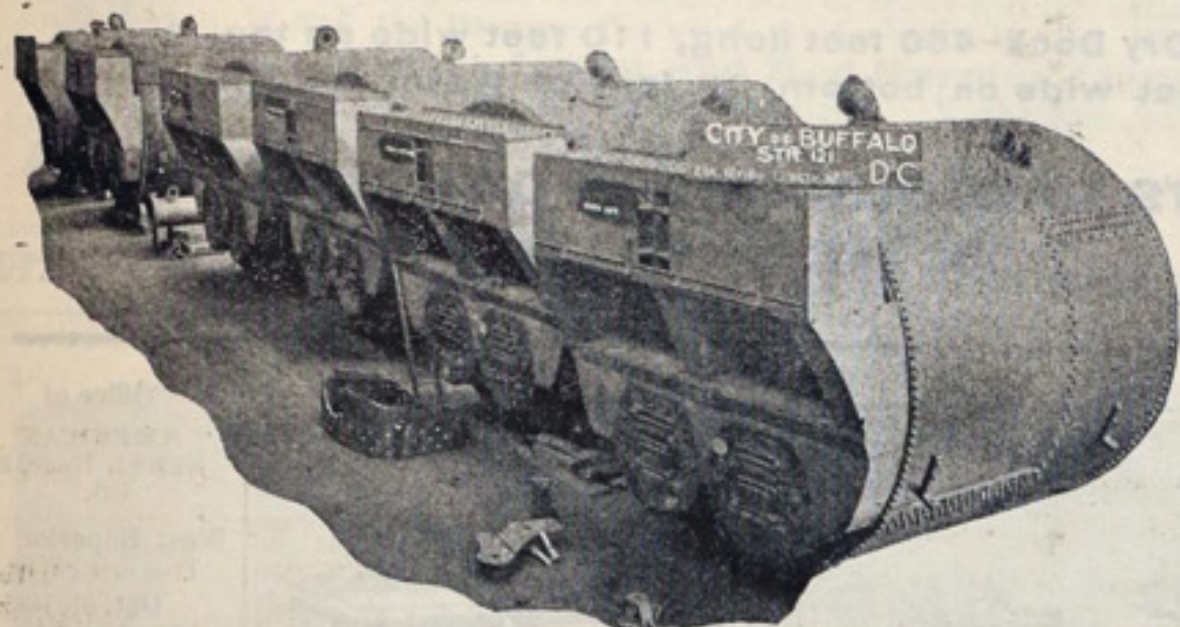
FOR SALE.

Naphtha Cruising Launch, 38 feet long, 8 feet beam, cabin with four berths, with wash room, ice box, and all modern conveniences, beveled edge plate glass windows, and mahogany finish throughout. Speed 10 miles per hour, brand new last year, and for sale cheap for cash if taken at once. For further particulars address **Box 616, Toledo, O.**

Dec. 1

Air is Cheap—Cheaper than Dirt!

FUEL IS DEAR—VERY DEAR! USE AIR AND SAVE FUEL!



Six Boilers with Howden Hot Draft appliances now in Side-Wheel Steamer City of Buffalo. Dimensions of each boiler—12 ft. 6 in. diameter by 12 ft. length.

ECONOMY in operating expenses on Lake Ships must come from reduced coal bills. No great saving can be made in labor cost, and provisions are already low. But fuel bills can be lowered and cheap coal used to advantage by adopting Modern Methods of making steam at low cost.

No manufacturer of pig iron would to-day think of running his furnace without a hot blast. Competition would not permit it. This same competition demands advanced practice in the operation of ships. The same principle is applied in the

HOWDEN HOT DRAFT

Now in use on Lake Steamers aggregating over 40,000 Horse Power.

CAN BE APPLIED TO OLD SHIPS AS WELL AS NEW ONES.

No complicated machinery. Cool engine rooms and cool fire holds. Estimates readily furnished for application of this draft to any steamer.

DRY DOCK ENGINE WORKS, DETROIT, MICH.

GIVE US a chance to prove that we can coal your boats with quick dispatch, and with most satisfactory fuel.

We have Four Large CHUTES on our Docks at AMHERSTBURG, ONTARIO, 1,000 FEET RIVER FRONT and Day and Night Force.

OUR STOCK CONSISTS OF

**“Keystone” Massillon, Youghioghenny,
and Best Grades of Hocking Koals.**

O. W. SHIPMAN, MAIN OFFICE, 90 Griswold St., Detroit, Mich.



Keeping a sharp look-out for Shipman's Coal Dock.

Cuddy-Mullen Coal Co. Lake Shippers of Steam Coal.

FUELING DEPARTMENT FACILITIES:

CLEVELAND HARBOR—

Car Dumper; Eight Pockets; Three Steam Derricks; Lighter.

DETROIT RIVER BRANCH—

Amherstburg, Steam Derricks; Sandwich, Ten Pockets and Two Steam Derricks.

SAULT RIVER BRANCH—

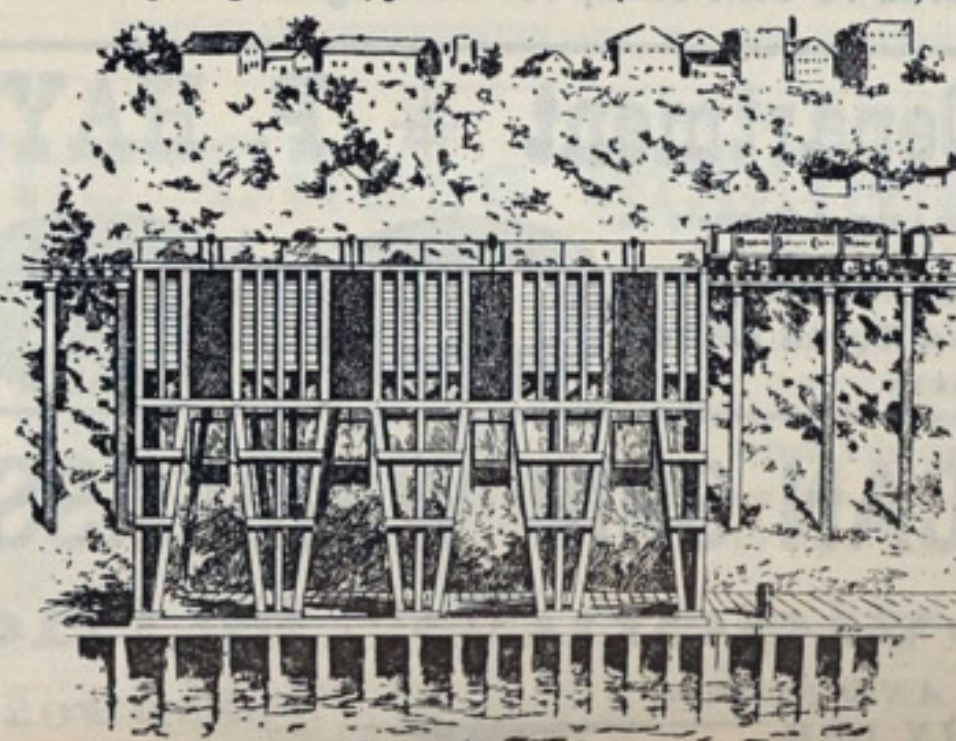
Pocket Dock now under construction.

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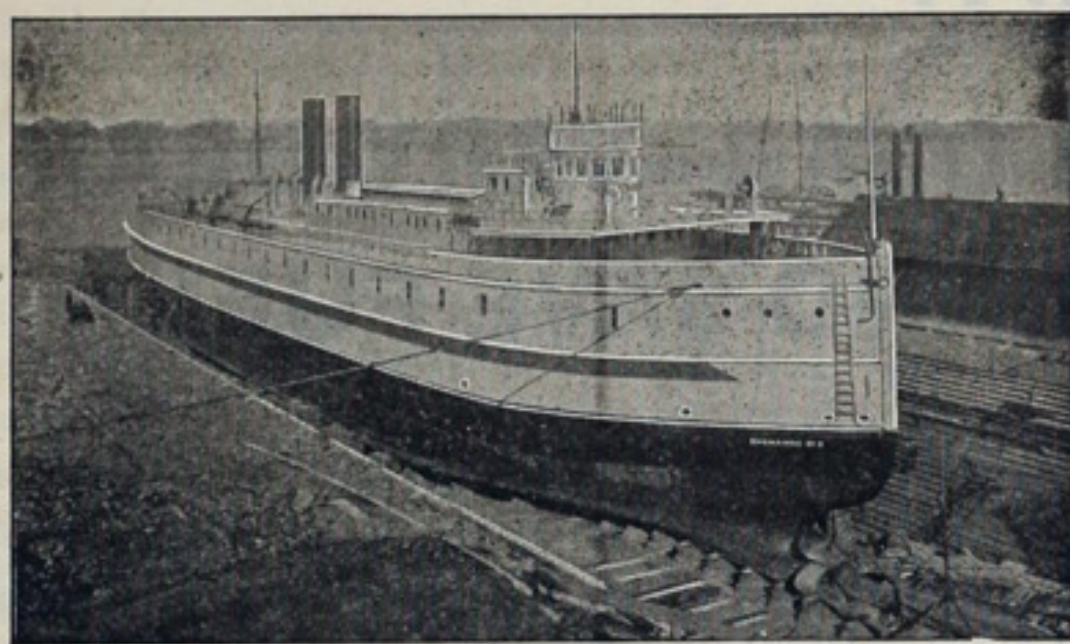


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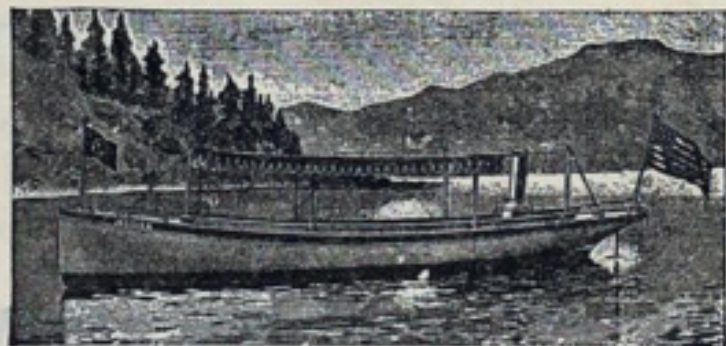
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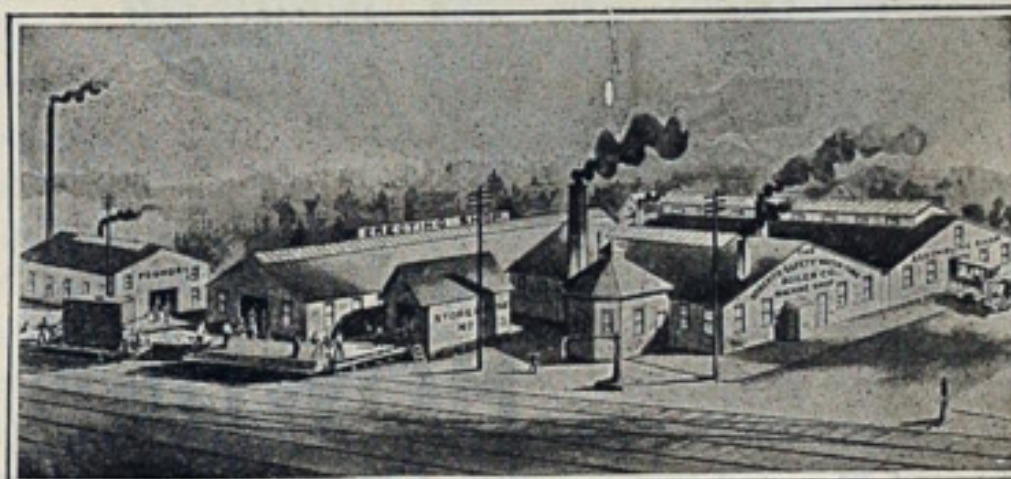
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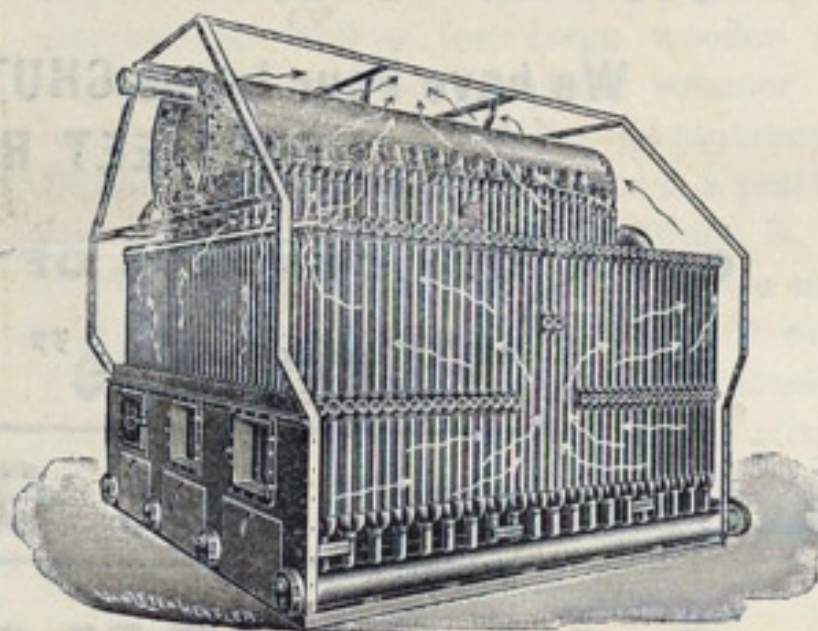
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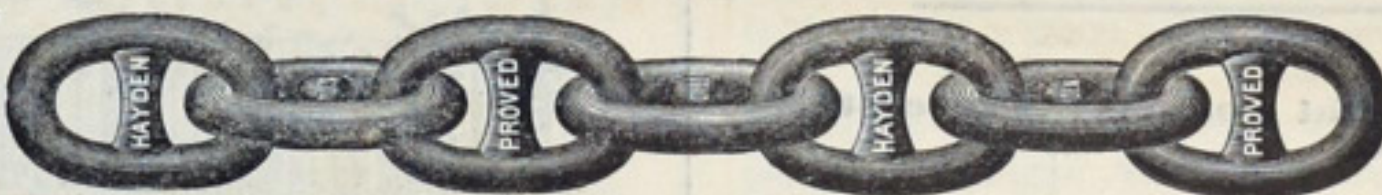
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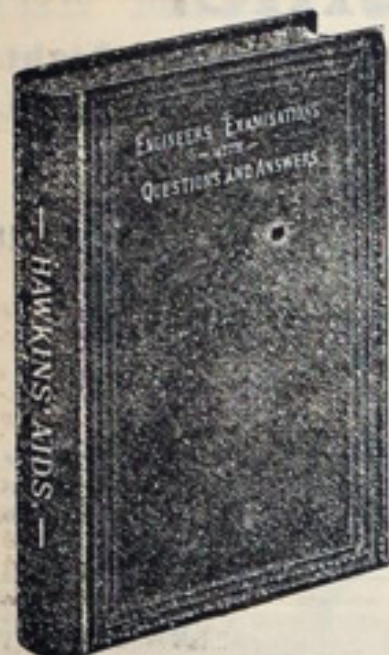
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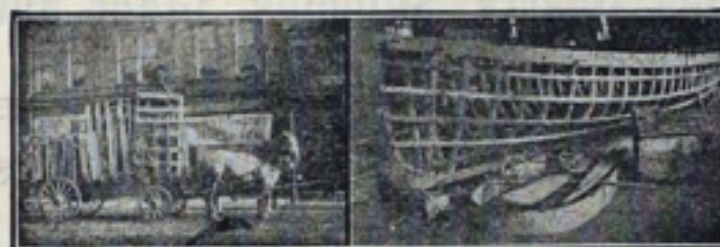
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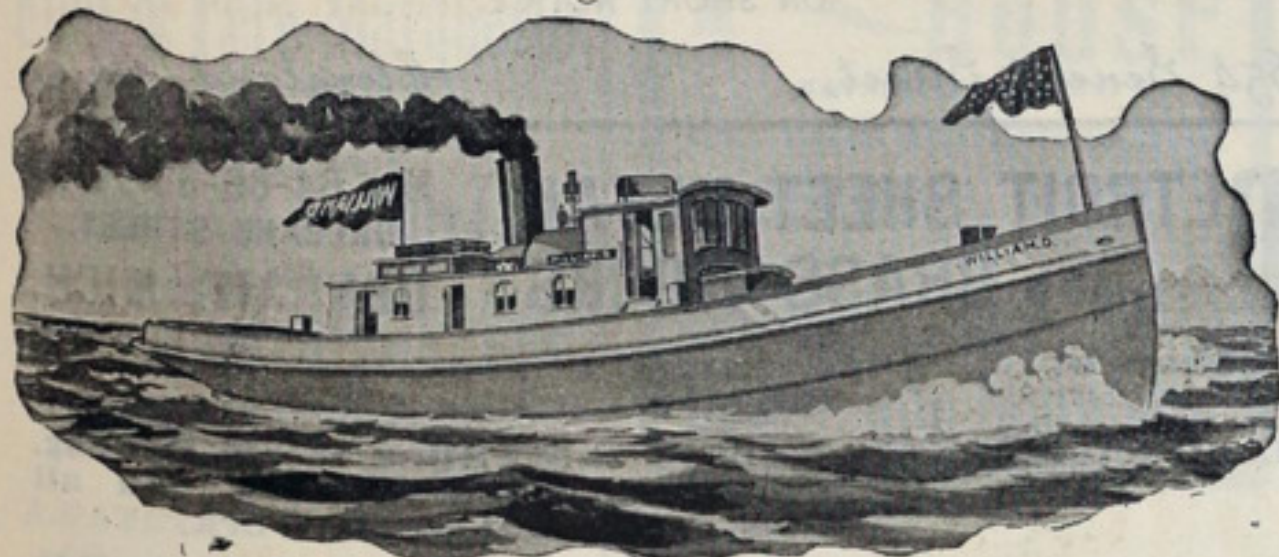
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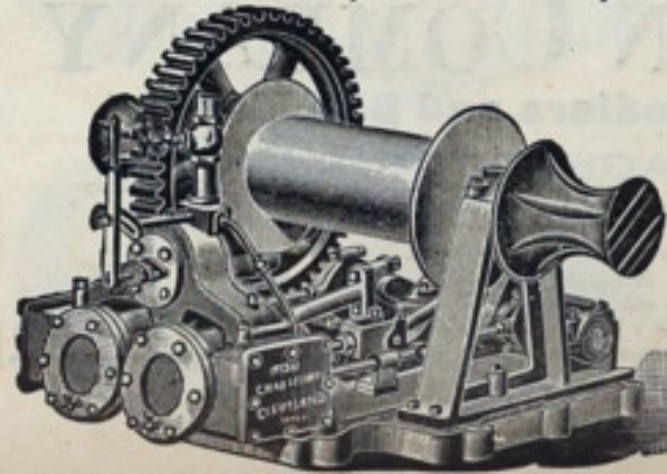
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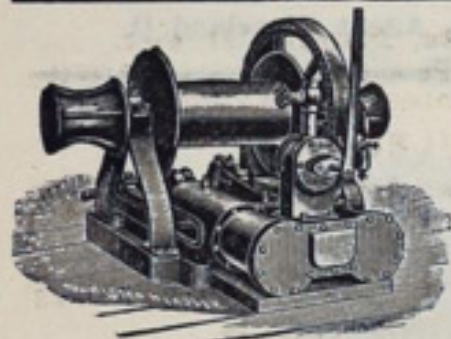
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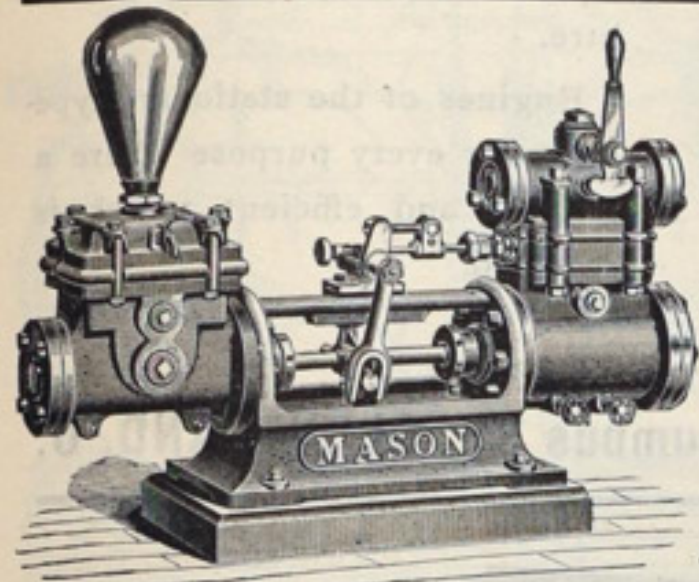
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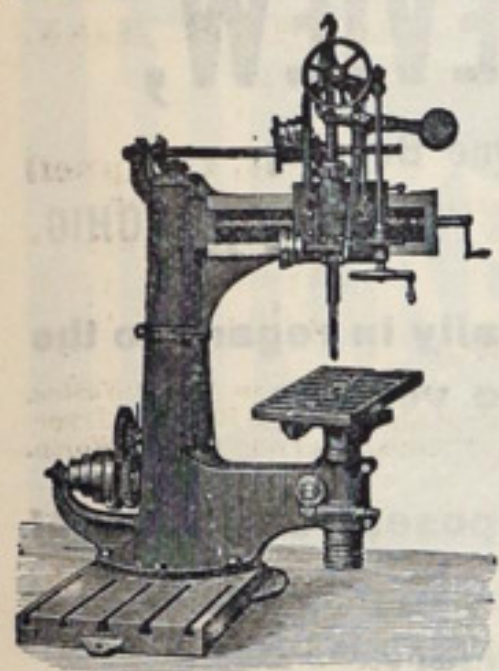
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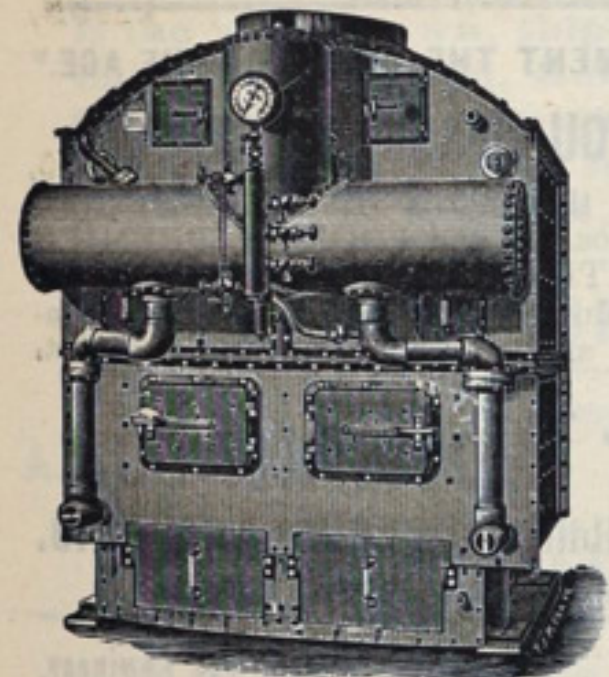
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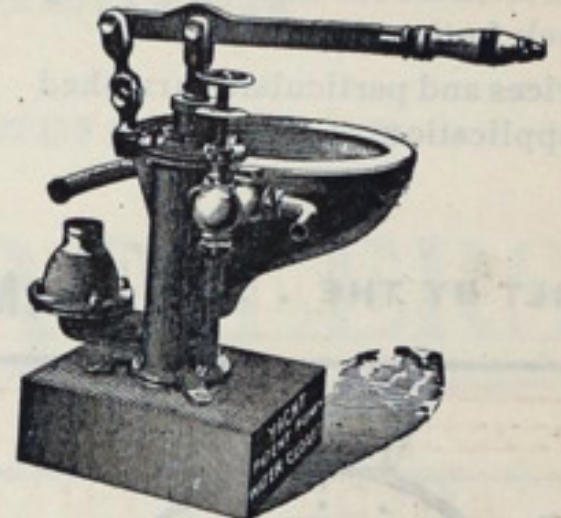
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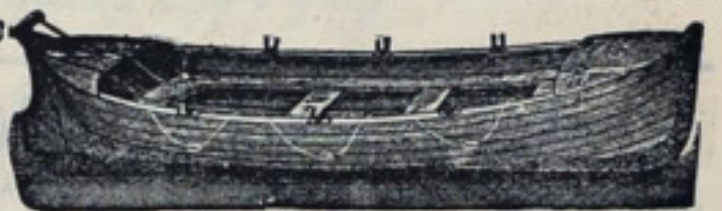
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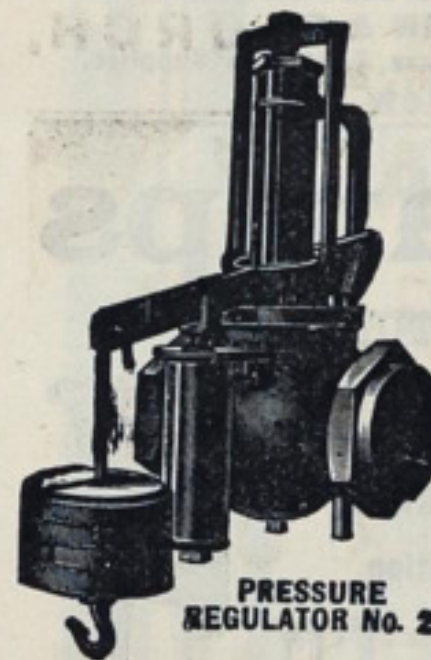
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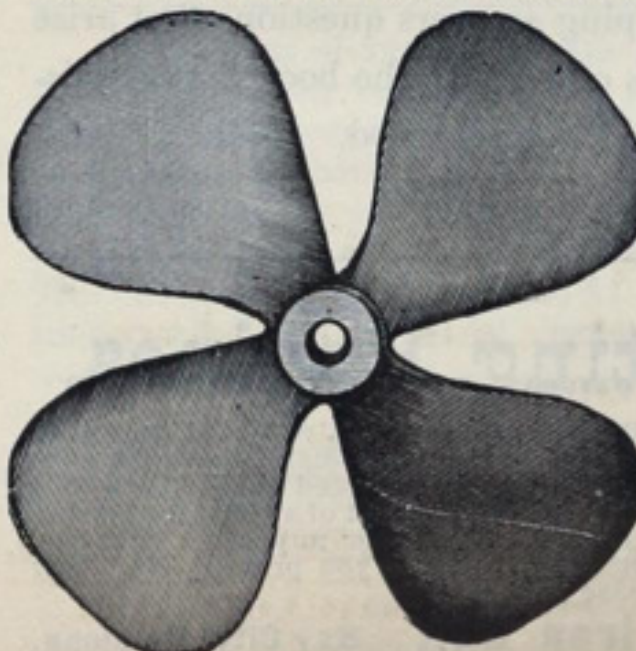
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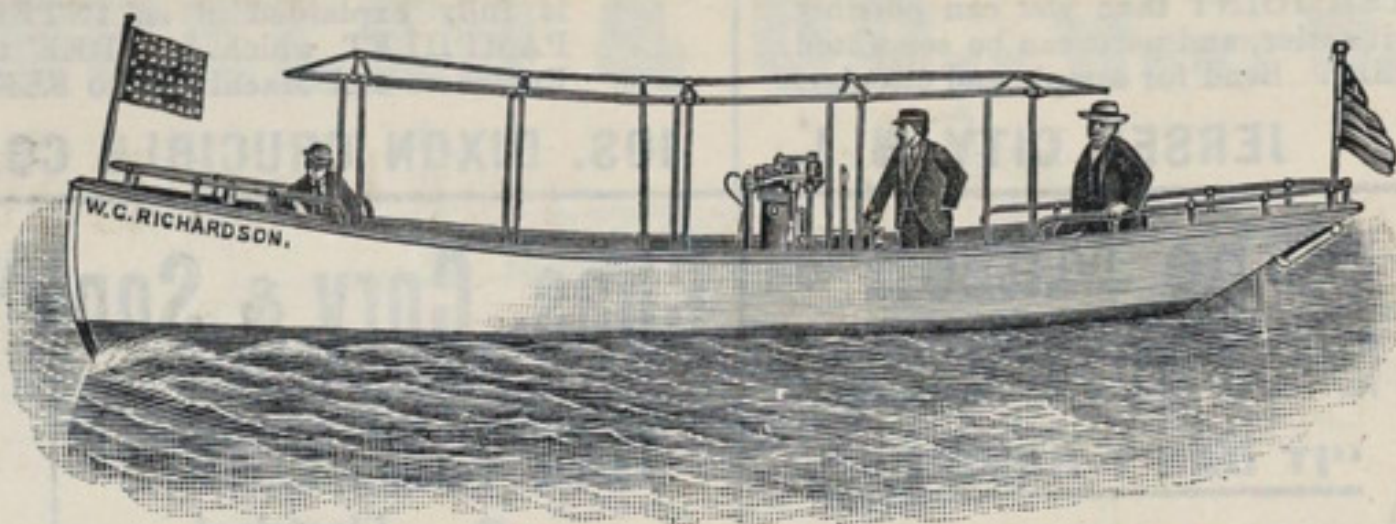
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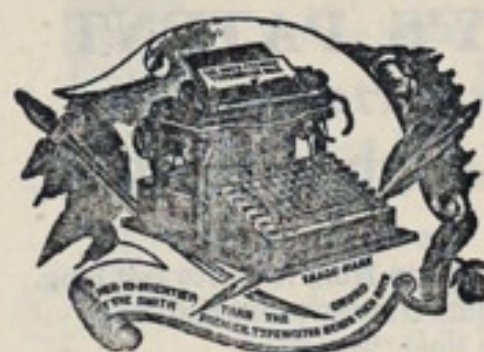
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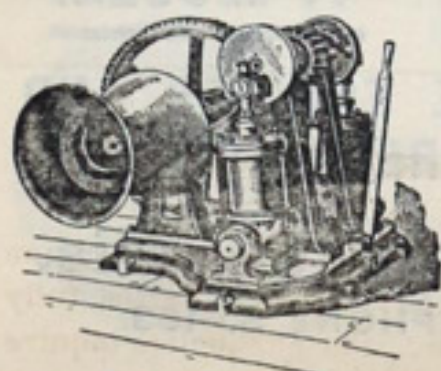
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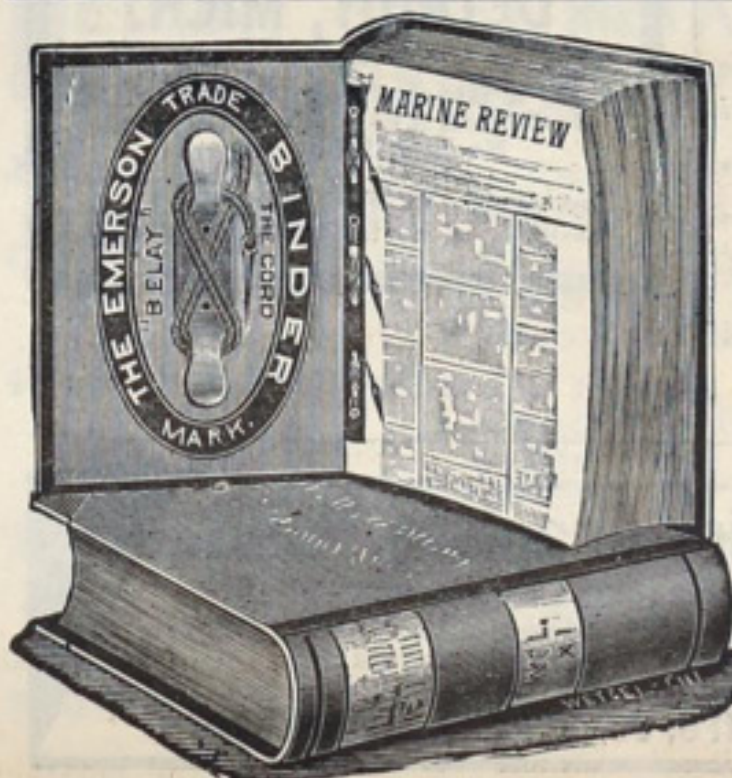
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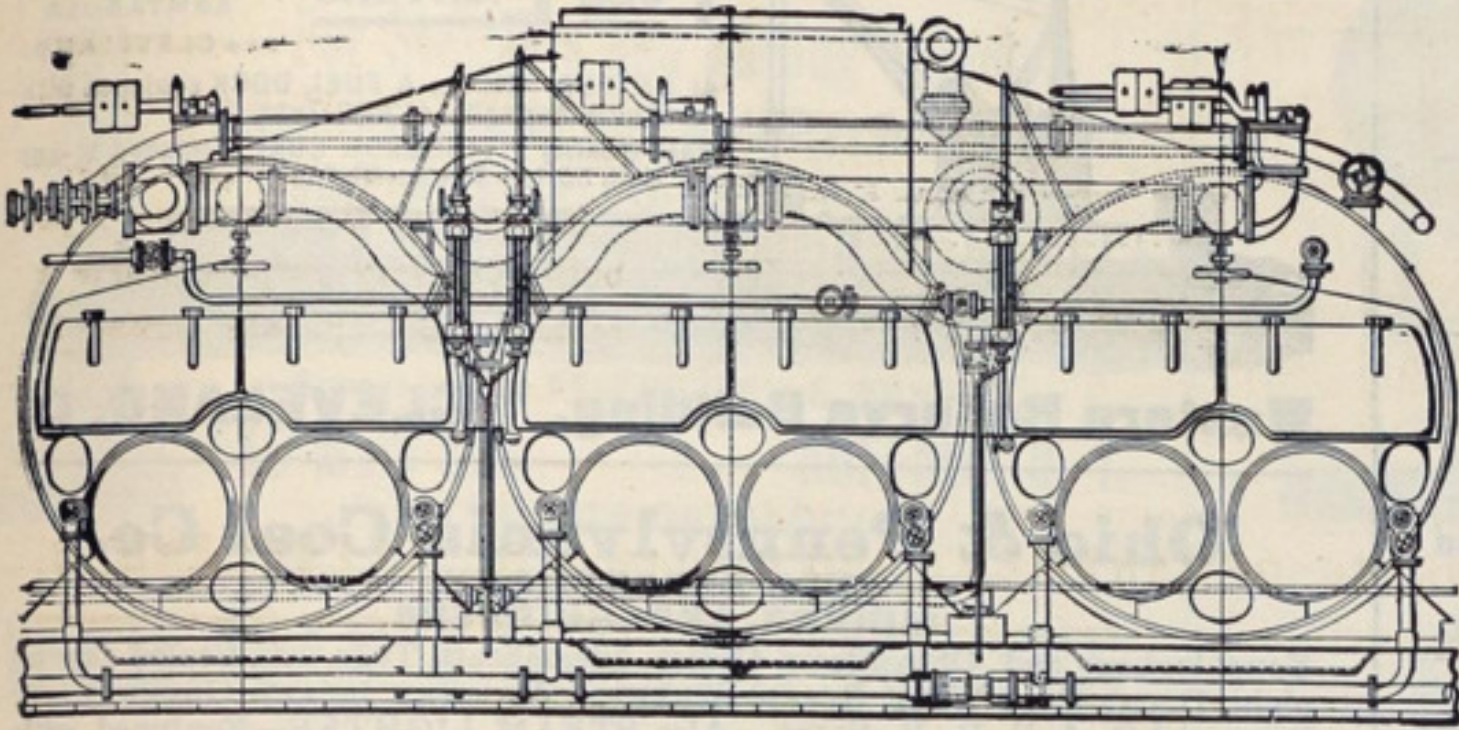
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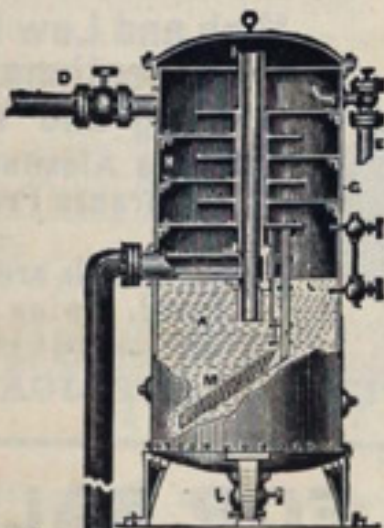
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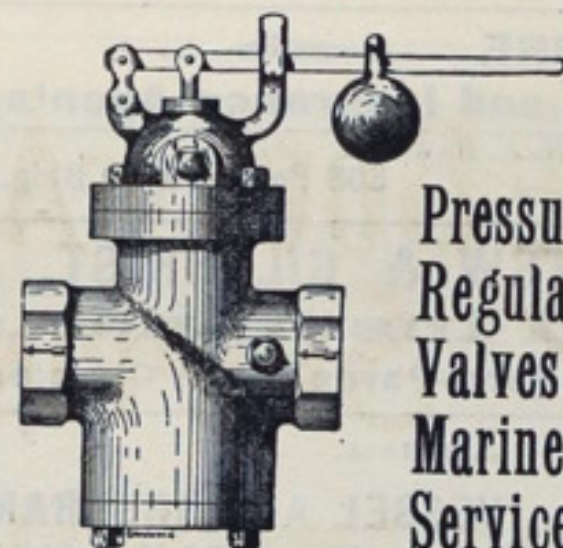
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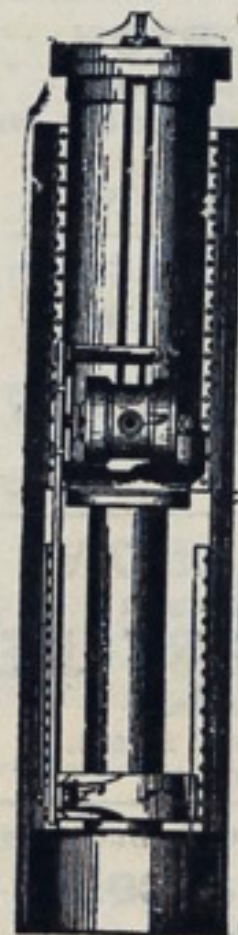
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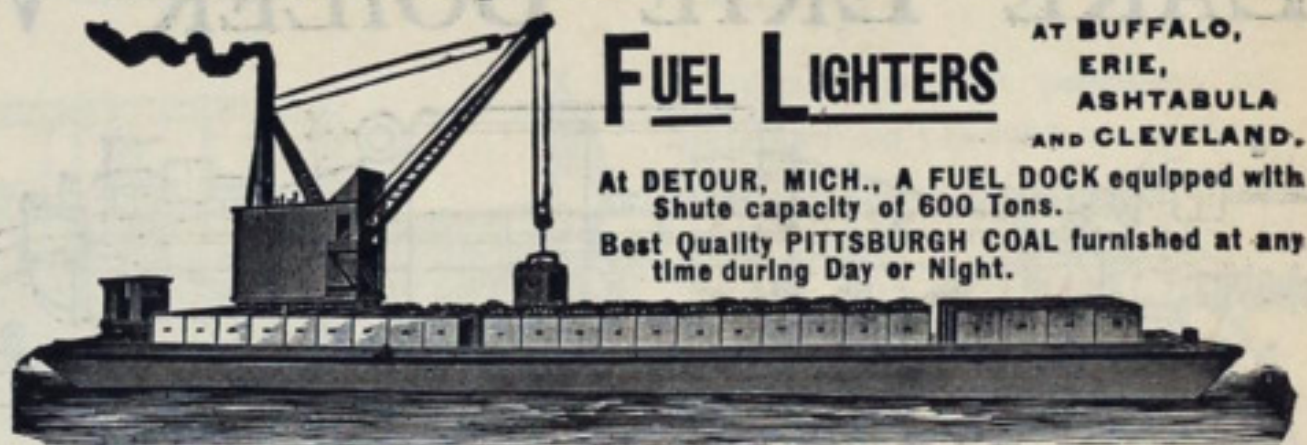
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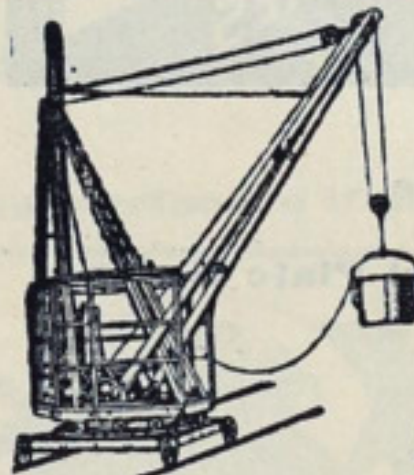
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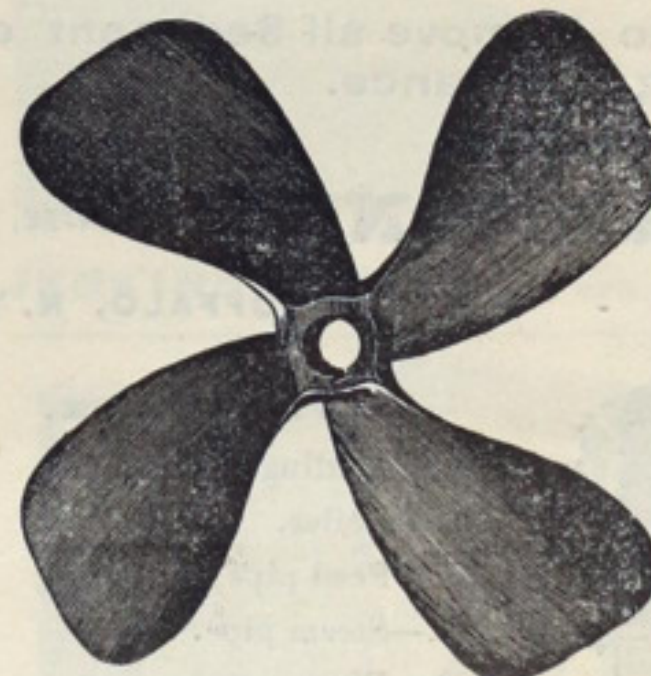
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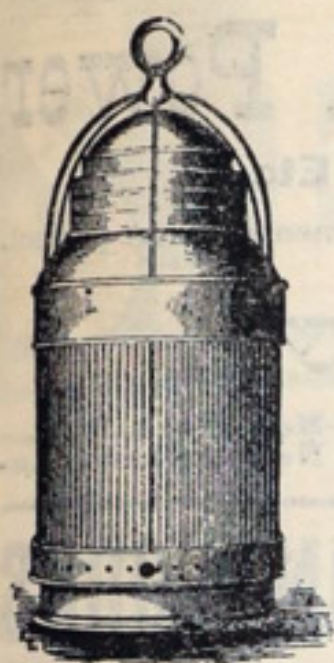
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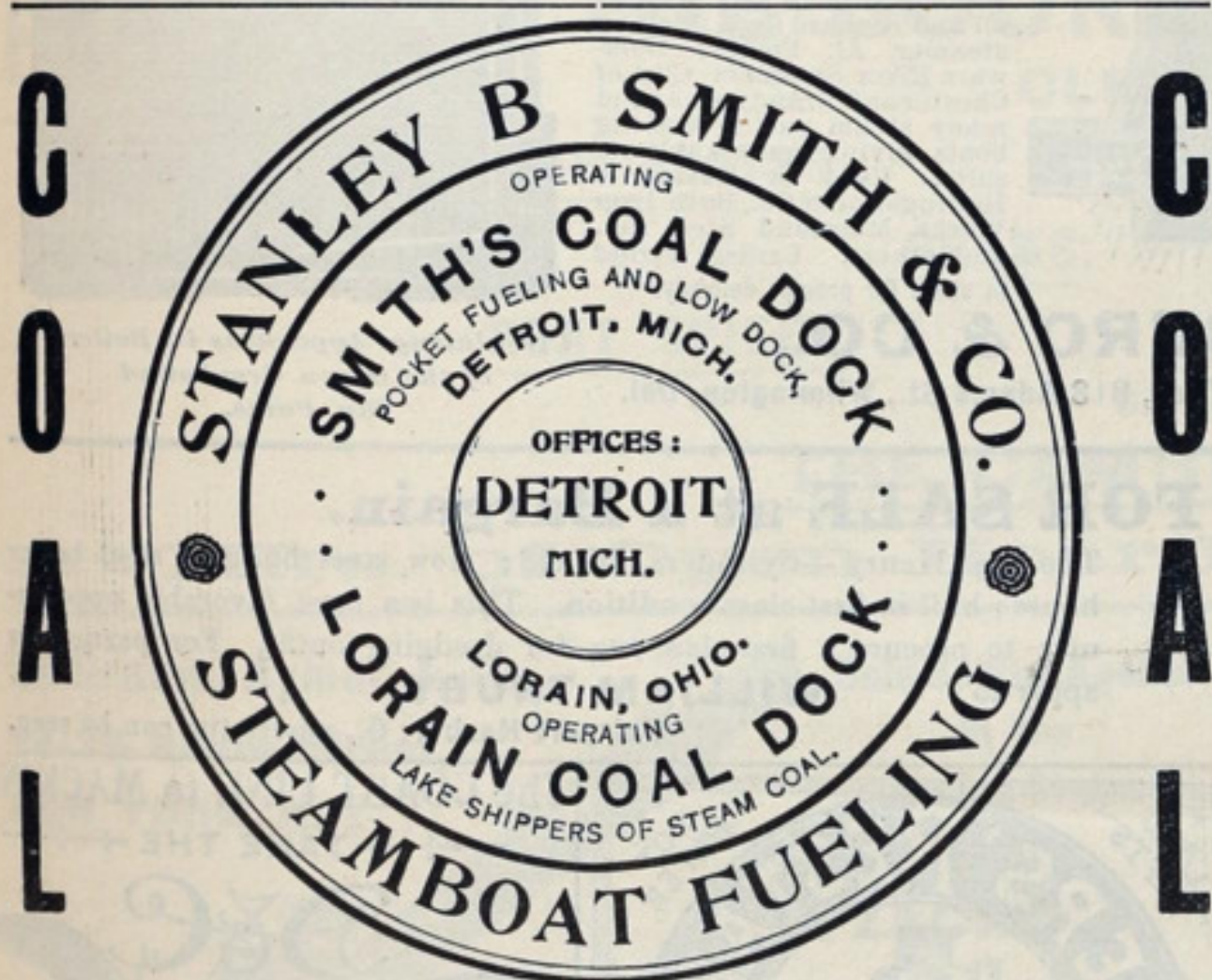
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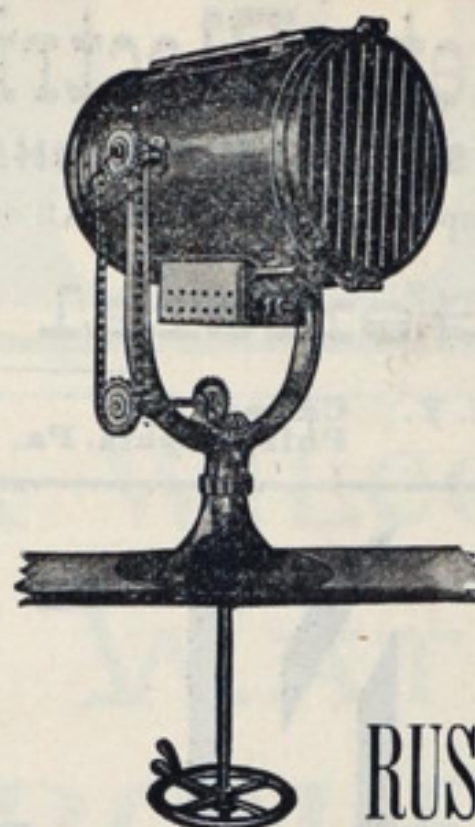
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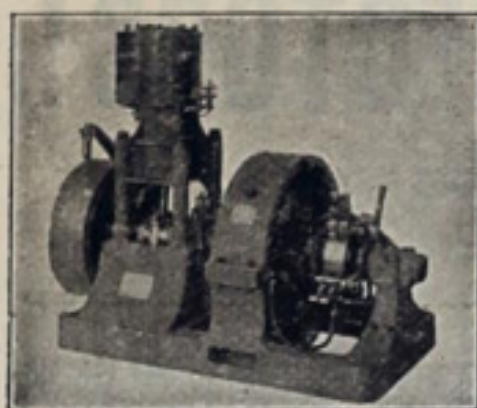
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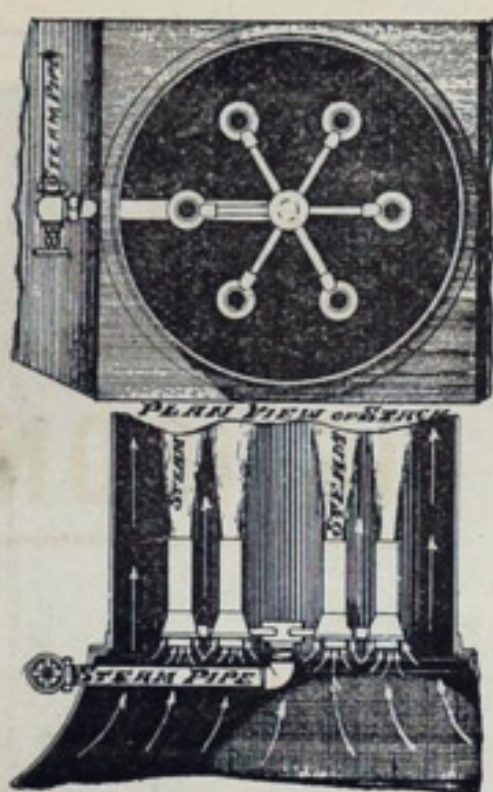
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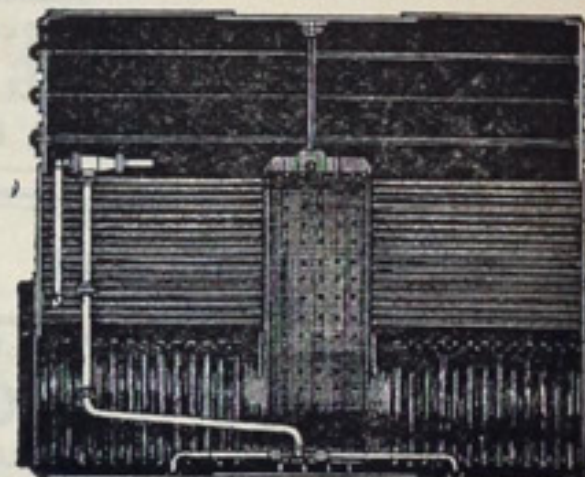
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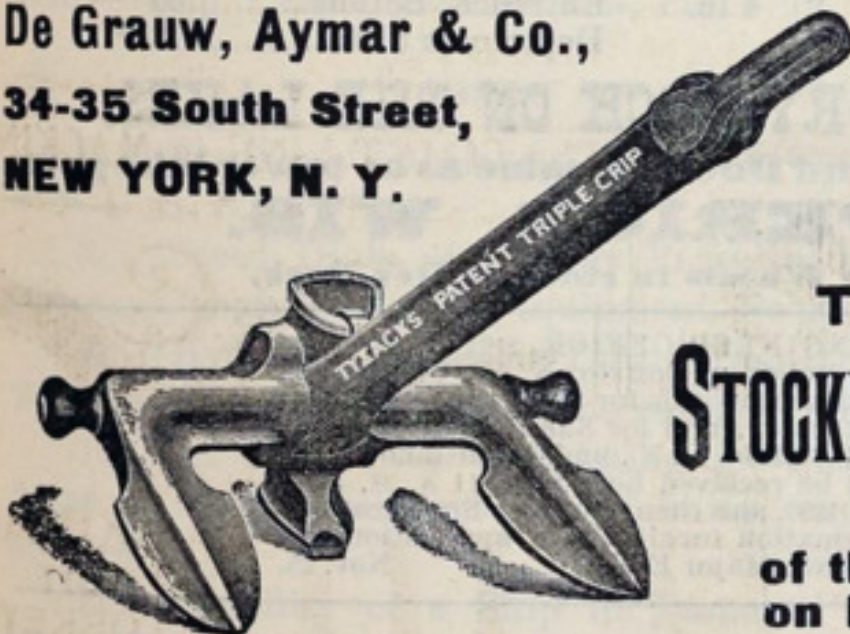
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Main Office, Perry-Payne Bldg., Cleveland. Miners and Shippers.

THE GEO. F. BLAKE MFG. CO.

BUILDERS OF

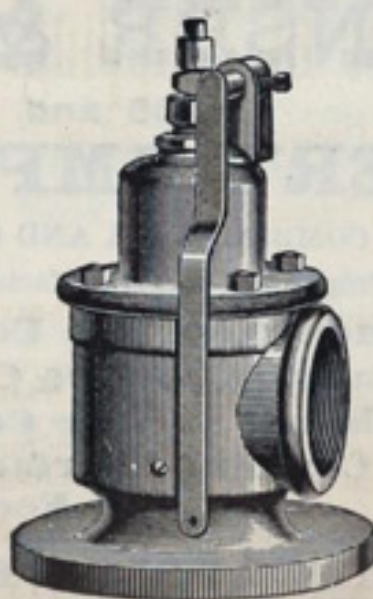
MARINE PUMPS

Single and Duplex Pumps for Boiler Feed,
Fire or Bilge Service—Vertical and Horizontal.
Vertical and Horizontal Pumps, Air Pumps
for Surface and Jet Condensers.



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95 and 97 Liberty St., NEW YORK.

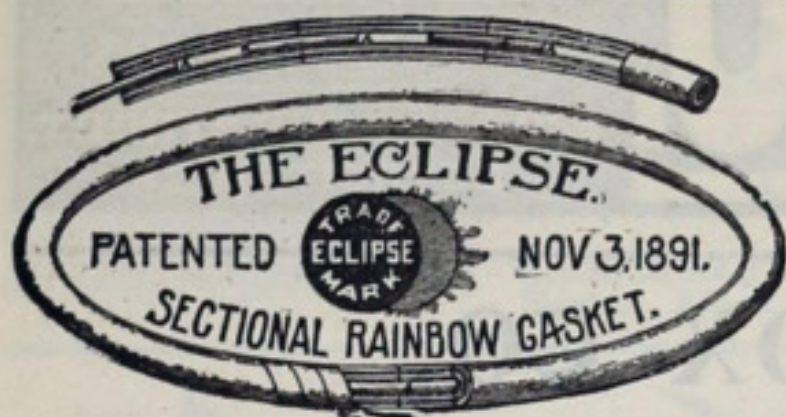


CROSBY STEAM GAGE AND VALVE CO.,

Sole Proprietors and Manufacturers of
Crosby Pop Safety Valves and Water Relief Valves Crosby Im-
proved Steam Gages, Single Bell Chime Whistles, Patent
Gage Testers, Victory Lubricators, and other specialties.
The Crosby Steam Engine Indicator, when required, is fur-
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BRANDEN PUMP VALVES, rubber with wire-coil insertion.
Manufacturers of all kinds of Pressure and Vacuum Gages,
Water Gages, Gage Cocks, Radiator Cocks, and other
Engine and Boiler Fittings and Supplies.
Branch Offices at New York, Chicago and London,
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WHY BE A FOGY?

GASKETS MADE INSTANTLY WITH



In Boxes
3 to 6
Lbs. each.

$\frac{3}{8}$ FOR UNIONS,
 $\frac{1}{2}$ FOR HAND HOLES,
 $\frac{5}{8}$ FOR MAN HOLES.

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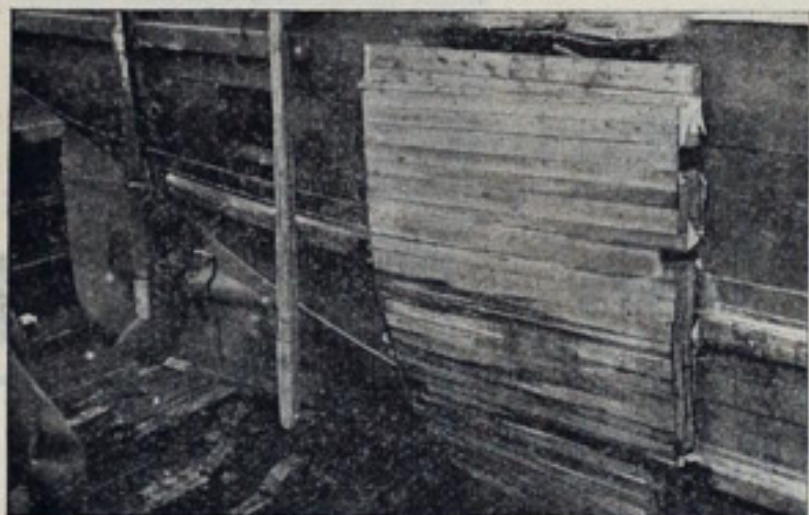
PEERLESS RUBBER MFG. CO.,

16 WARREN STREET, N.Y.

For Sale by the leading Ship Chandlers and Supply Houses.

The Cleveland Dry Dock Co.

148 Elm St., Cleveland, O.



Wm Chisholm in Dock.

Telephone 1616.
Resid. Phone 4080.

REPAIRING A SPECIALTY.

Dimensions of Dock:

Lth. over all, 360 ft.
Lth. on blocks, 340 ft.
Width of gate, 50 ft.
Depth over sill, 20 ft.

Capt. W. W. BROWN,
Sec'y & Mgr.

AMERICAN STEEL BARGE CO.

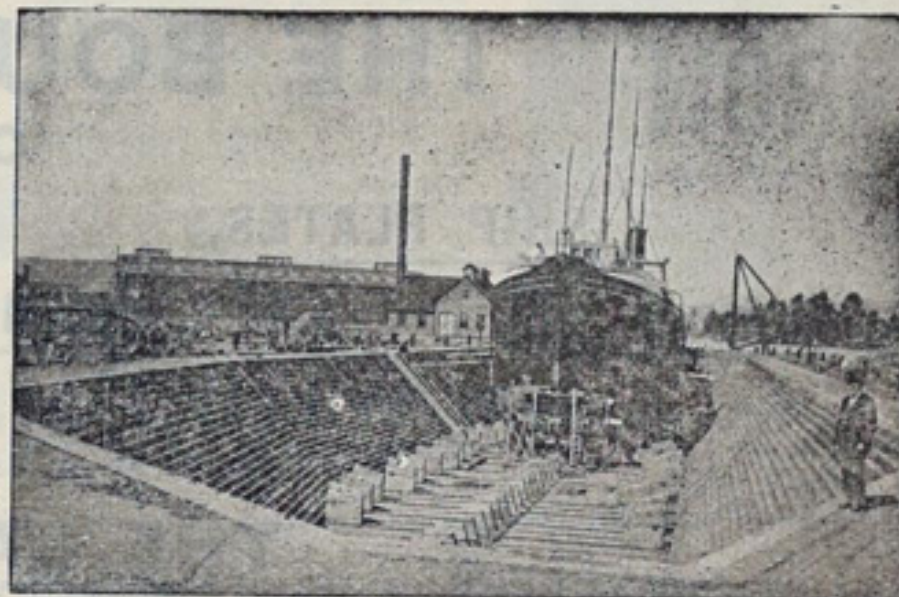
STEEL and METAL SHIPS

Of all classes built on the Shortest Possible Notice at our yards at

West Superior, Wis., and also at Everett, Wash.

Photograph of 300 ft. Boat in Dock.

Plates &
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Always
on hand
to Re-
pair all
kinds of
Metal
Ships in
Shortest
Time.



Best
Quality
of Oak
instock
for Re-
pairing
Wooden
Vessels
of all
Classes.

SIZE OF DOCK.

Length, extreme.....537 feet.	Entrance, Top.....55 feet 9 in.
Breadth, Top 90 " 4 in.	Entrance, Bottom.....50 "
Breadth, Bottom 52 "	Depth over Sills18 "

LARGEST DRY DOCK ON THE LAKES.

Prices for Repairs and Docking same as at lower lake ports

SUPERIOR, WIS.

A number of Propellor Wheels in stock at Dry Dock.

U. S. ENGINEER OFFICE, 1101 D. S. Morgan Building, Buffalo, N. Y., October 15, 1896. Sealed proposals for 12,500 feet of Break-water extension, and for Sand-Catch Pier extension at Buffalo, N. Y., under continuous contract will be received here until 11 A. M. November 30, 1896, and then opened. Specifications and information furnished on application. T. W. SYMONS, Major Engrs. Nov. 25.

FOR SALE

TUG DUNCAN CITY. Length 112 feet, beam 19 feet, depth of hold 9 feet 3 inches; enclosed upper works and draws 10 feet. Steeple compound condensing engine, 18 and 36 by 26 inches. Built in 1891. Steel boiler, built in 1889, 15 feet long by 9 feet diameter. Tested for 150 pounds pressure. Has coal capacity for 145 tons; is well adapted for long and heavy towing or any kind of tug work; is a powerful boat and in prime condition. Can be seen at Cheboygan, Mich. Apply to Thompson Smith's Sons. Nov. 15.



IRON OR STEEL FORGINGS FINISHED COMPLETE, ROUGH MACHINED OR SMOOTH FORGED ONLY, OF ANY WEIGHT.
COUPLING LINKS AND PINS. PRESSED WROUGHT IRON TURNBUCKLES. CAR IRON SPECIALTIES.

WM. WILFORD'S

Matchless Water-Proof Canvas.

The best in the market for Hatch Covers, is stronger, lighter and more durable than any Water-Proof Goods yet produced. It is made of a twisted thread of pure flax which renders it very strong. It will not crack like Cotton Goods or take fire as easily, which is a great advantage, if soft coal is used.

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WHEELER CONDENSER & ENGINEERING COMPANY,

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WHEELER'S IMPROVED SURFACE CONDENSERS

MOUNTED UPON COMBINED AIR AND CIRCULATING PUMPS.

Sole Proprietors and Manufacturers of the

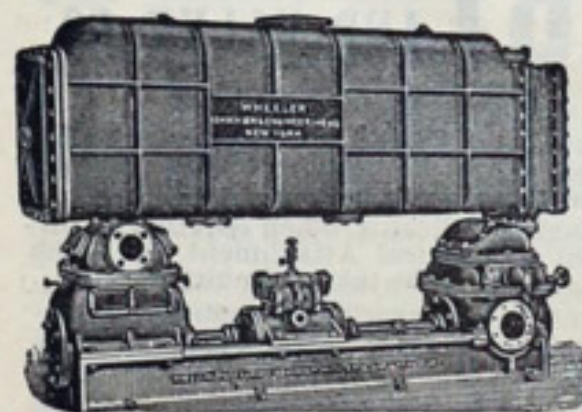
Wheeler Standard Surface Condenser.

Wheeler Admiralty Surface Condenser.

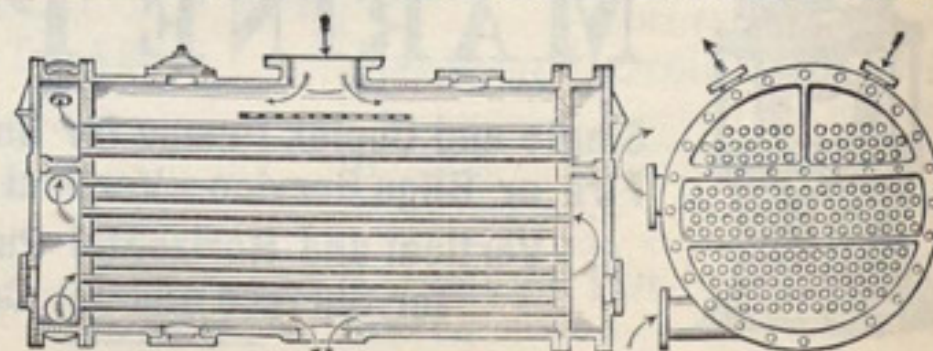
Wheeler Lighthall Surface Condenser.

Volz Patent Combined Surface Condenser
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Wheeler's Improved Marine Feed Water Heater.



Wheeler Surface Condenser.
Mounted on Combined Air & Circulating Pumps.



Patent Combined Surface Condenser & Feed-Water Heater